Switch Installation

This chapter describes how to install your switch, interpret the power-on self-test (POST), and connect the switch to other devices.

Caution If your installation is in a hazardous environment, see Appendix B, "Installation In a Hazardous Environment" for instructions.

Read these topics, and perform the procedures in this order:

Preparing for Installation

This section provides information about these topics:

Warnings

These warnings are translated into several languages in the Regulatory Compliance and Safety Information Guide.

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43**

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001**

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003**

Warning **Read the installation instructions before you connect the system to its power source. Statement 1004**

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017**

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024**

Warning **This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028**

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030**

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040**

Warning **For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection. 10/100/1000 Ethernet Statement 1044**

Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of:
140°F (60°C) Statement 1047**

Warning **Installation of the equipment must comply with local and national electrical codes. Statement 1074**

Warning **To prevent airflow restriction, allow clearance around the ventilation openings to be at least:
4.13 in. (105 mm). Statement 1076**

Installation Guidelines

When determining where to place the switch, observe these guidelines.

Environment and Enclosure Guidelines:

Review these environmental and enclosure guidelines before installation:

- This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 9842 ft (3 km) without derating.
- This equipment is considered Group 1, Class A industrial equipment, according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.
- This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame-spread rating of 5VA, V2, V1, V0 (or equivalent) if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication might contain additional information regarding specific enclosure-type ratings that are required to comply with certain product safety certifications.

Other Guidelines

These are other installation guidelines:

Caution Proper ESD protection is required whenever you handle Cisco equipment. Installation and maintenance personnel should be properly grounded by using ground straps to eliminate the risk of ESD damage to the switch.

Do not touch connectors or pins on component boards. Do not touch circuit components inside the switch. When not in use, store the equipment in appropriate static-safe packaging.

- Personnel responsible for the application of safety-related programmable electronic systems (PES) shall be aware of the safety requirements in the application of the system and shall be trained in using the system.

Caution The device is designed to mount on a DIN rail that conforms to Standard EN50022.

When determining where to place the switch, observe these guidelines:

- Before installing the switch, first verify that the switch is operational by powering it on and running POST. Follow the procedures in the "Verifying Switch Operation" section on page 2-13.
- For 10/100 ports and 10/100/1000 ports, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).
- For 100BASE-FX fiber-optic ports, the cable length from a switch to an attached device cannot exceed 6562 ft (2 km).
- For 100BASE-X SFP ports in the IEM-3000-4SM and the IEM-3000-8SM expansion modules, the cable length is dependent on the type of SFP installed in the port.
- Operating environment is within the ranges listed in Appendix A, "Technical Specifications."
- Clearance to front and rear panels meets these conditions:
  - Front-panel LEDs can be easily read.
  - Access to ports is sufficient for unrestricted cabling.
  - Front-panel direct current (DC) power and relay connector is within reach of the connection to the DC power source.
- Airflow around the switch and through the vents is unrestricted. To prevent the switch from overheating, there must be the following minimum clearances:
  - Top and bottom: 4.13 in. (105 mm)
  - Exposed side (not connected to the module): 3.54 in. (90 mm)
  - Front: 2.56 in. (65 mm)
- Temperature surrounding the unit does not exceed 140°F (60°C).

Note When the switch is installed in an industrial enclosure, the temperature within the enclosure is greater than normal room temperature outside the enclosure.

The temperature inside the enclosure cannot exceed 140°F (60°C), the maximum ambient enclosure temperature of the switch.

- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures.
- Connect the unit only to a Class 2 DC power source.

Caution This equipment is only suitable for use in Class I, Division 2, Groups A, B, C, D, or nonhazardous locations.

Verifying Package Contents

Carefully remove the contents from the shipping container, and check each item for damage. If any item is missing or damaged, contact your Cisco representative or reseller for support. Return all packing materials to the shipping container and save them.

The switch is shipped with these items:

- Documentation CD that includes:
  - *Cisco IE 3000 Switch Getting Started Guide (*in English, German, French, Spanish, Italian, Japanese, and simplified Chinese)
  - *Regulatory Compliance and Safety Information for the Cisco IE 3000 Switch*
- *Regulatory Compliance and Safety Information for the Cisco IE 3000 Switch* (safety warnings translated in German)
- Two power and relay connectors
- RJ-45 to DB-9 console port adapter cable

Note To connect the switch functional ground, you need a ring terminal lug (such as Thomas & Bett part number RC10-14 or equivalent).

If you want to connect a terminal to the switch console port, you need to provide an RJ-45-to-DB-25 female DTE adapter. You can order a kit (part number ACS-DSBUASYN=) with that adapter from Cisco.

For multimode (MM) connections, you can connect a 100BASE-FX port to a port on a target device by using an dual-LC connector.

You can order a kit containing four spare latches (DINCLP-IE3000=) from Cisco.

Adding Modules to the Switch

The Cisco IE-3000-4TC or the Cisco IE-3000-8TC switch can operate as standalone devices with four or eight Fast Ethernet ports, respectively. To increase the number of Fast Ethernet ports by 8 or 16, you can connect the Cisco IEM-3000-8TM and the Cisco IEM-3000-8FM expansion modules. You can also add either 4 or 8 100BASE-X SFP ports by installing the Cisco IEM-3000-4SM or Cisco IEM-3000-8SM expansion modules. PoE-capable ports can also be added to the switch by installing either the IEM-3000-4PC or the IEM-3000-4PC-4TC PoE expansion modules. Depending on the mix of switches and expansion modules, you can have up to 24 Fast Ethernet ports.

Note The expansion modules cannot operate as standalone devices.

Expansion Module Configurations

Both the IE-3000-4TC and the IE-3000-8TC can be configured with one or two expansion modules to increasing the number and type of ports for the switch. Table 2-1 lists the supported port combinations of switch and expansion modules. The table also provides a breakdown of the type and quantity of ports for a particular switch expansion module configuration.

Table 2-1 Cisco IE-3000-4TC and Cisco IE-3000-8TC Switch Expansion Module Configurations and Port Types

Expansion Module Configurations		Port Types and Quantity (Including Switch Ports)	
Expansion Module 1	**Expansion Module 2**	**IE-3000-4TC Switch**	**IE-3000-8TC Switch**
—	—	10/100FE—4	10/100FE—8
Cisco IEM-3000-4PC	—	10/100FE—4 10/100BASE-T—4	10/100FE—8 10/100BASE-T—4
Cisco IEM-3000-4PC	Cisco IEM-3000-4PC	10/100FE—4 10/100BASE-T—8	10/100FE—8 10/100BASE-T—8
Cisco IEM-3000-4PC	Cisco IEM-3000-4PC-4TC	10/100FE—4 10/100BASE-T—12	10/100FE—8 10/100BASE-T[2]—12
Cisco IEM-3000-4PC	Cisco IEM-3000-4SM	10/100FE—4 100BASE-X—4 10/100BASE-T—4	10/100FE—8 100BASE-X—4 10/100BASE-T—4
Cisco IEM-3000-4PC	Cisco IEM-3000-8FM	10/100FE—4 100FX—8 10/100BASE-T—4	10/100FE—8 100FX—8 10/100BASE-T—4
Cisco IEM-3000-4PC	Cisco IEM-3000-8SM	10/100FE—4 100BASE-X—8 10/100BASE-T—4	10/100FE—8 100BASE-X—8 10/100BASE-T—4
Cisco IEM-3000-4PC	Cisco IEM-3000-8TM	10/100FE—12 10/100BASE-T—4	10/100FE—16 10/100BASE-T—4
Cisco IEM-3000-4PC-4TC	—	10/100FE—4 10/100BASE-T—8	10/100FE—8 10/100BASE-T—8
Cisco IEM-3000-4PC-4TC	Cisco IEM-3000-4PC	10/100FE—4 10/100BASE-T—12	10/100FE—8 10/100BASE-T—12
Cisco IEM-3000-4PC-4TC	Cisco IEM-3000-4PC-4TC	10/100FE—4 10/100BASE-T—16	10/100FE—8 10/100BASE-T—16
Cisco IEM-3000-4PC-4TC	Cisco IEM-3000-4SM	10/100FE—4 100BASE-X—4 10/100BASE-T—4	10/100FE—8 100BASE-X—4 10/100BASE-T—4
Cisco IEM-3000-4PC-4TC	Cisco IEM-3000-8FM	10/100FE—4 100FX—8 10/100BASE-T—8	10/100FE—8 100FX—8 10/100BASE-T—8
Cisco IEM-3000-4PC-4TC	Cisco IEM-3000-8SM	10/100FE—4 100BASE-X—8 10/100BASE-T—8	10/100FE—8 100BASE-X—8 10/100BASE-T—8
Cisco IEM-3000-4PC-4TC	Cisco IEM-3000-8TM	10/100FE—12 10/100BASE-T—8	10/100FE—16 10/100BASE-T—8
Cisco IEM-3000-4SM	—	10/100FE—4 100BASE-X—4	10/100FE—8 100BASE-X—4

Table 2-1 Cisco IE-3000-4TC and Cisco IE-3000-8TC Switch Expansion Module Configurations and Port Types (continued)

Expansion Module Configurations		Port Types and Quantity (Including Switch Ports)	
Expansion Module 1	**Expansion Module 2**	**IE-3000-4TC Switch**	**IE-3000-8TC Switch**
Cisco IEM-3000-4SM	Cisco IEM-3000-4PC	10/100FE—4 100BASE-X—4 10/100BASE-T—4	10/100FE—8 100BASE-X—4 10/100BASE-T—4
Cisco IEM-3000-4SM	Cisco IEM-3000-4PC-4TC	10/100FE—4 100BASE-X—4 10/100BASE-T—8	10/100FE—8 100BASE-X—4 10/100BASE-T—8
Cisco IEM-3000-4SM	Cisco IEM-3000-4SM	10/100FE—4 100BASE-X—4 10/100BASE-T—4	10/100FE—8 100BASE-X—4 10/100BASE-T—4
Cisco IEM-3000-4SM	Cisco IEM-3000-8FM	10/100FE—4 100FX—8 100BASE-X—4	10/100FE—8 100FX—8 100BASE-X—4
Cisco IEM-3000-4SM	Cisco IEM-3000-8SM	10/100FE—4 100BASE-X—12	10/100FE—8 100BASE-X—12
Cisco IEM-3000-4SM	Cisco IEM-3000-8TM	10/100FE—12 100BASE-X—4	10/100FE—16 100BASE-X—4
Cisco IEM-3000-8FM	—	10/100FE—4 100FX—8	10/100FE—8 100FX—8
Cisco IEM-3000-8SM	—	10/100FE—4 100BASE-X—8	10/100FE—8 100BASE-X—8
Cisco IEM-3000-8TM	—	10/100FE—12	10/100FE—16
Cisco IEM-3000-8TM	Cisco IEM-3000-4PC	10/100FE—12 10/100BASE-T—4	10/100FE—16 10/100BASE-T—4
Cisco IEM-3000-8TM	Cisco IEM-3000-4PC-4TC	10/100FE—12 10/100BASE-T—8	10/100FE—16 10/100BASE-T—8
Cisco IEM-3000-8TM	Cisco IEM-3000-4SM	10/100FE—12 100BASE-X—4	10/100FE—16 100BASE-X—4
Cisco IEM-3000-8TM	Cisco IEM-3000-8FM	10/100FE—12 100FX—8	10/100FE—16 100FX—8
Cisco IEM-3000-8TM	Cisco IEM-3000-8SM	10/100FE—12 100BASE-X—8	10/100FE-—16 100BASE-X—8
Cisco IEM-3000-8TM	Cisco IEM-3000-8TM	10/100FE—20	10/100FE—24

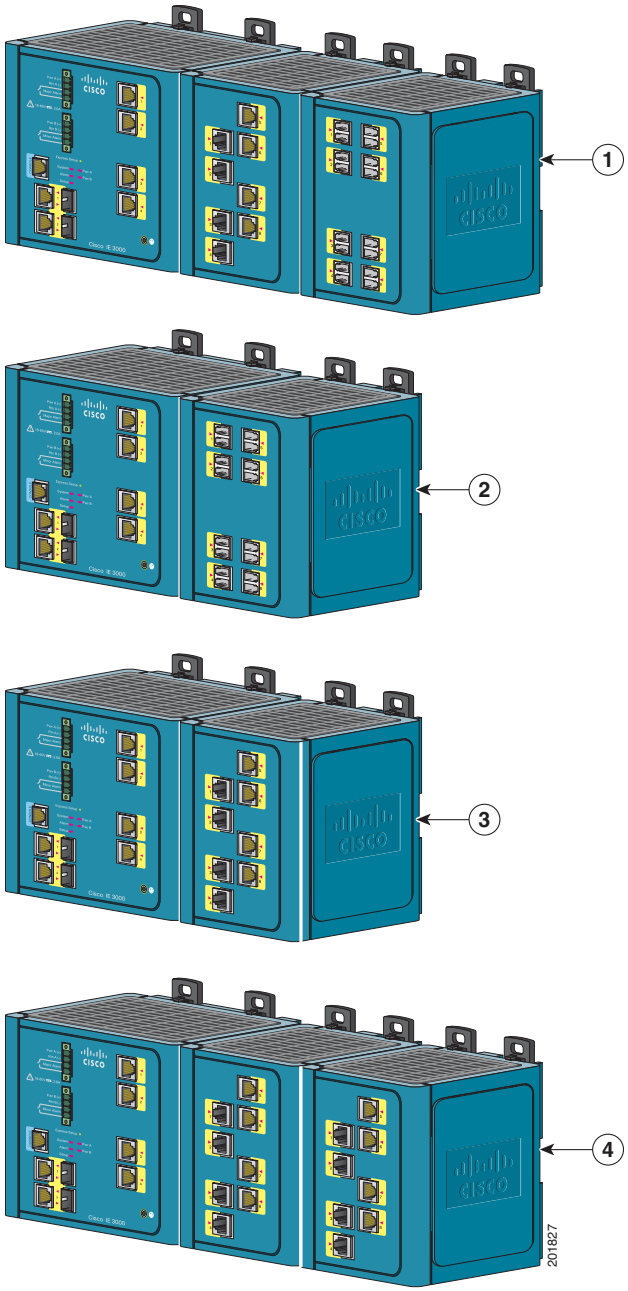
Caution The four PoE ports on the expansion module can be configured as four PoE or four PoE+ (pending sufficient PoE power per modular) in the industrial control and hazardous location. The switch can only support up to two PoE+ ports per expansion module if installed in an office or computer IT room environment due to safety compliance IEC 60950.

Figure 2-1 shows four sample combinations of the Cisco IE-3000-4TC switch and expansion modules. A full list of combinations is contained in Table 2-1

Note The switch and expansion module sample combinations illustrated in Figure 2-1 show an IE-3000-4TC switch. The same sample combinations could also be used with the Cisco IE-3000-8TC switch.

Note Due to power constraints, a configuration that includes either IE 3000 switch and two IEM-3000-8SM expansion modules is not supported. Also, no expansion modules can be attached to the right of an IEM-3000-8SM expansion module.

Figure 2-1 Sample Combinations of Expansion Modules



1	Cisco IE-3000-4TC switch with Cisco IEM-3000-8TM and Cisco IEM-3000-8FM expansion modules (12 FE and 8 FX ports)	**3**	Cisco IE-3000-4TC switch with one Cisco IEM-3000-8TM expansion modules (12 FE ports)
2	Cisco IE-3000-4TC switch with one Cisco IEM-3000-8FM expansion module (4 FE and 8 FX ports)	**4**	Cisco IE-3000-4TC switch with two Cisco IEM-3000-8TM expansion modules (20 FE ports)

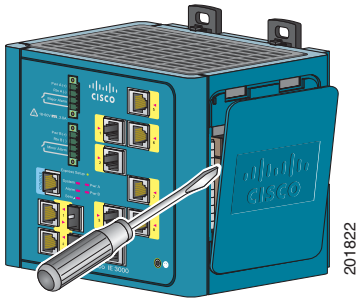
Connecting Modules

Note Expansion modules are not hot-swappable. You must turn off power to the switch before adding or removing an expansion module.

To connect the expansion modules to the switch, follow these steps:

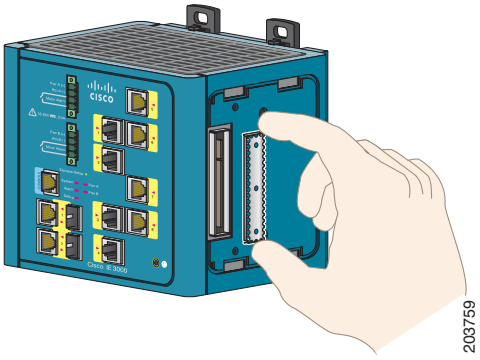
Step 1 Remove the side panel of the switch by firmly grasping both sides of it in the middle and pulling it outward. If necessary, use a screwdriver to pry open the side panel. See Figure 2-2.

Figure 2-2 Opening the Side Panel of the Cisco IE-3000-8TC Switch



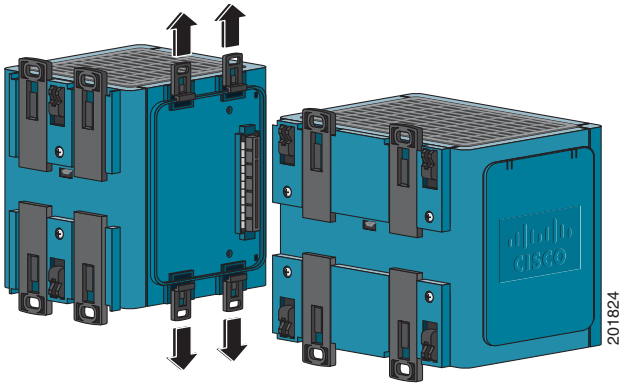
Step 2 Remove the EMI protective cover from the interface connector on the switch. See Figure 2-2.

Figure 2-3 Removing the EMI Cover



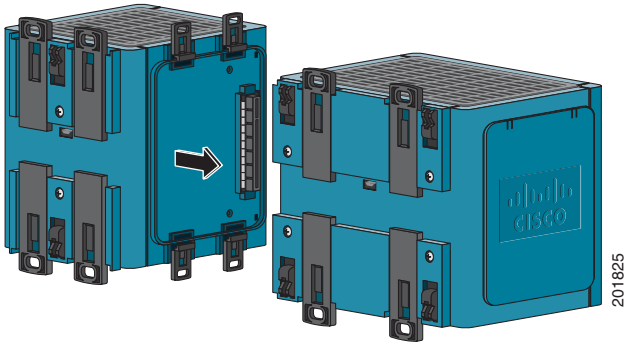
Step 3 Push up the upper module latches (at the top of the switch and the expansion module). See Figure 2-4. Push down the lower module latches (at the bottom of the switch and the expansion module).

Figure 2-4 Pushing the Module Latches Up



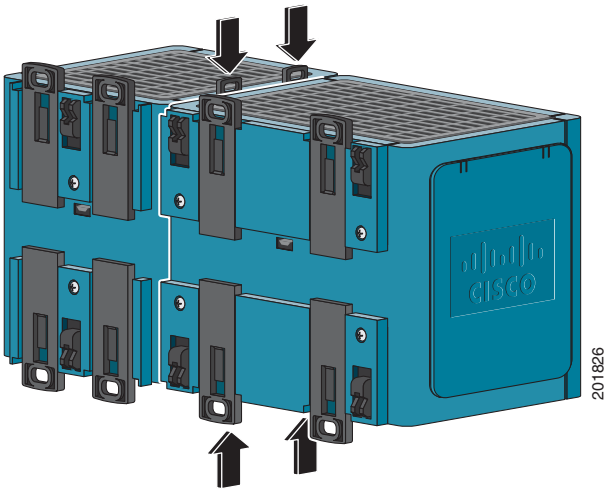
Step 4 Align the connectors on the switch and the module, and slide the switch and the module together to make the connection. See Figure 2-5.

Figure 2-5 Connecting the Switch and the Module



Step 5 Push the upper module latches down and the lower latches up. See Figure 2-6.

Figure 2-6 Pushing the Module Latches In



Step 6 If you are going to install a second expansion module to the switch expansion module combination, follow Step 1 through Step 5.

Note Refer to Table 2-1 for a list of supported switch and expansion module combinations.

If you are attaching an IEM-3000-4PC or IEM-3000-4PC-4TC PoE expansion module to the switch, you must also connect the expansion modules to source DC. Source DC can come from either the PWR-IE65W-PC-DC, a DC-input power supply, the PWR-IE65W-PC-AC, an AC-input power supply, or from site source DC; however, the site source power voltage must be 48-54VDC.

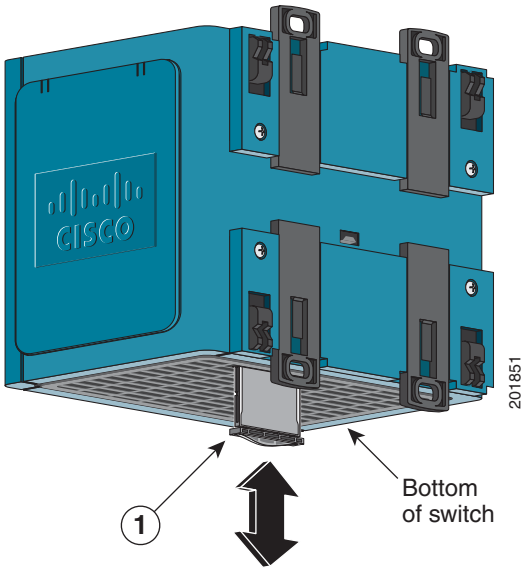
Installing or Removing the Compact Flash Memory Card

The switches store Cisco IOS software images and switch configurations on a removable flash memory card. You can replace the switch without reconfiguring it. The switch ships with the compact flash memory card installed. Verify that the card is in place on the bottom of the switch.

Follow these directions to remove or replace the compact flash memory card:

Step 1 Locate the compact flash memory card slot on the bottom of the switch. See Figure 2-7.

Figure 2-7 Removing the Compact Flash Memory Card from the Switch



1	Compact flash memory card		

Step 2 Install or remove the card, as desired:

- To remove the card, grasp the card top, and pull it out. Place it in an antistatic bag to protect it from static discharge.
- To install a card, slide it into the slot, and press it firmly in place. The card is keyed so that you cannot insert it the wrong way.

Verifying Switch Operation

Before installing the switch in its final location, power on the switch, and verify that the switch passes the power-on self-test (POST).

These sections describe the steps required to connect a PC or terminal to the switch console port, to power on the switch, and to observe POST results:

- Connecting a PC or a Terminal to the Console Port, page 2-14
- Verifying Switch Operation, page 2-13

Connecting a PC or a Terminal to the Console Port

To connect a PC to the console port, use the supplied RJ-45-to-DB-9 adapter cable. To connect a terminal to the console port, you need to provide an RJ-45-to-DB-25 female DTE adapter. You can order a kit (part number ACS-DSBUASYN=) with that adapter from Cisco. For console-port and adapter-pinout information, see the "Cable and Adapter Specifications" section on page C-5.

The PC or terminal must support VT100 terminal emulation. The terminal-emulation software—frequently a PC application such as HyperTerminal or Procomm Plus—makes communication between the switch and your PC or terminal possible during the POST.

Follow these steps to connect the PC or terminal to the switch:

Step 1 Make sure that your terminal-emulation software is configured to communicate with the switch using hardware flow control.

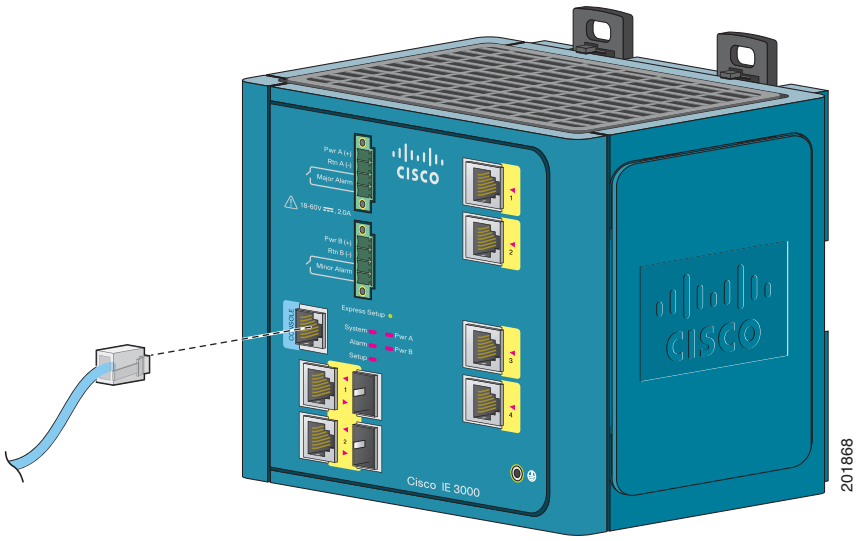
Step 2 Configure the baud rate and data format of the PC or terminal to match these console-port default characteristics:

- 9600 baud
- Eight data bits
- One stop bit
- No parity

After you get access to the switch, you can change the port baud rate. See the switch software configuration guide for instructions.

Step 3 Insert the adapter cable in the console port. See Figure 2-8. (See the "Cable and Adapter Specifications" section on page C-5 for pinout descriptions.)

Figure 2-8 Connecting to the Console Port



Step 4 Attach the appropriate adapter to the terminal, if needed.

Step 5 Connect the other end of the adapter cable to the PC or terminal adapter.

Step 6 Start the terminal-emulation software on the PC.

Connecting the Protective Ground and DC Power

These sections describe the steps required to connect a protective ground and DC power to the switch:

- Grounding the Switch, page 2-15
- Wiring the DC Power Source, page 2-18
- Attach the Power and Relay Connector to the Switch, page 2-23

Note The Cisco IE 3000 switch can be used with an optional AC/DC power converter (PWR-IE3000-AC).

For instructions on how to connect the power converter to the switch, see the "Connecting the Switch to the Power Converter" section on page 2-48.

Locate the power and relay connector in the switch accessory kit.

Note You can get replacement power and relay connectors (PWR-IE3000-CNCT=) by calling Cisco Technical Support. See the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section on page viii.

Obtain these necessary tools and equipment:

- Ratcheting torque flathead screwdriver that can exert up to 15 inch-pounds (in-lb) of torque
- Ring terminal lug (such as Thomas & Bett part number 10RCR or equivalent)
- Crimping tool (such as Thomas & Bett part number WT2000, ERG-2001, or equivalent)
- 10-gauge copper ground wire (such as Belden part number 9912 or equivalent)
- For DC power connections, use UL- and CSA-rated, style 1007 or 1569 twisted-pair copper appliance wiring material (AWM) wire (such as Belden part number 9318).
- Wire-stripping tools for stripping 10- and 18-gauge wires

Grounding the Switch

To ground the switch to earth ground by using the ground screw, follow these steps. Make sure to follow any grounding requirements at your site.

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024**

Warning **This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use. Statement 1064**

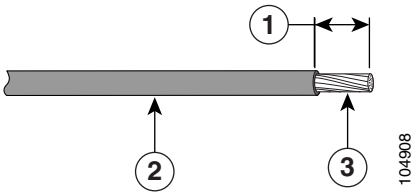
Caution To make sure that the equipment is reliably connected to earth ground, follow the grounding procedure instructions, and use a UL-listed ring terminal lug suitable for number 10-to-12 AWG wire, such as Thomas & Bett part number 10RCR or equivalent.

Note Use at least a 4mm^2 conductor to connect to the external grounding screw.

Step 1 Use a standard Phillips screwdriver or a ratcheting torque screwdriver with a Phillips head to remove the ground screw from the front panel of the switch. Store the ground screw for later use.

Step 2 Use a wire-stripping tool to strip the 10-gauge wire to 0.5 inch. (12.7 mm) ± 0.02 inch (0.5 mm). See Figure 2-9.

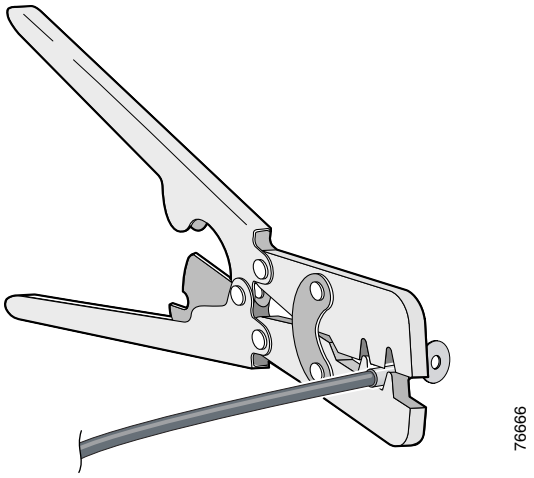
Figure 2-9 Stripping the Ground Wire



1	0.5 in. (12.7 mm) ± 0.02 in. (0.5 mm)	**3**	Wire lead
2	Insulation		

Step 3 Insert the ground wire into the ring terminal lug, and using a crimping tool, crimp the ring terminal to the wire.

Figure 2-10 Crimping the Ring Terminal

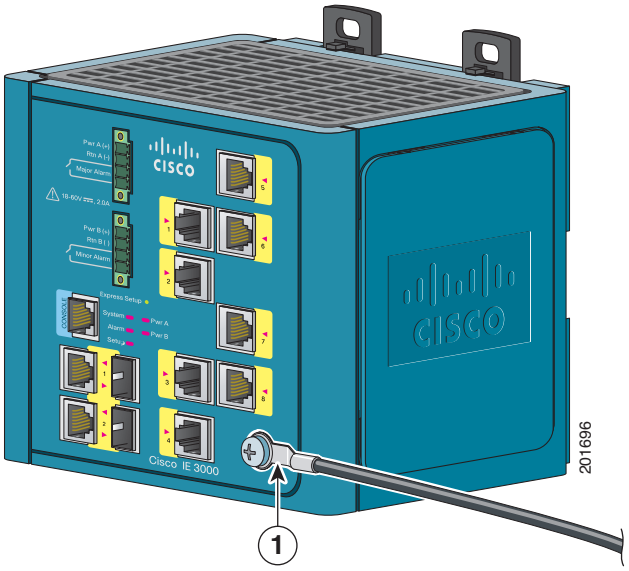


Step 4 Slide the ground screw through the ring terminal.

Step 5 Insert the ground screw into the functional ground screw opening on the front panel.

Step 6 Use a ratcheting torque screwdriver to tighten the ground screw and ring terminal lug to the switch front panel to 8.5 in-lb. The torque should not exceed 8.5 in-lb (0.9 Nm). See Figure 2-11.

Figure 2-11 Attaching the Ground-Lug Screw



1	Ground cable with ring terminal lug

Step 7 Attach the other end of the ground wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded bare rack.

Wiring the DC Power Source

Read these warnings before wiring the DC power source:

Caution This product is intended to be powered by a Listed Class 2 power source marked with "Class 2" and rated from 18 to 60 VDC ±0 VDC, 2.1 A.

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022**

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 5A. Statement 1005**

Warning **Installation of the equipment must comply with local and national electrical codes. Statement 1074**

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003**

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030**

Caution You must connect the switch only to a DC-input power source that has an input supply voltage from 18 to 60 VDC ±0 VDC. If the supply voltage is not in this range, the switch might not operate properly or might be damaged.

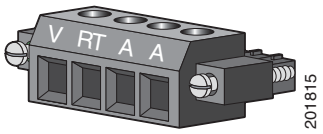
Caution For wire connections to the power and relay connector, you must use UL- and CSA-rated, style 1007 or 1569 twisted-pair copper appliance wiring material (AWM) wire (such as Belden part number 9318).

To wire the switch to the optional AC/DC converter, go to the "Connecting the Switch to the Power Converter" section on page 2-48.

To wire the switch to a DC-input power source, follow these steps:

Step 1 Locate the power and relay connector (see Figure 2-12).

Figure 2-12 Power and Relay Connector

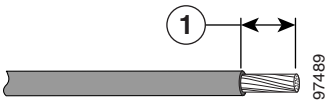


Step 2 Identify the positive and return DC power connections on the connector. The positive DC power connection is labeled V, and the return is the adjacent connection labeled RT. See Figure 2-12.

Step 3 Measure two strands of twisted-pair copper wire (18-to-20 AWG) long enough to connect to the DC power source.

Step 4 Using an 18-gauge wire-stripping tool, strip each of the two twisted pair wires coming from each DC-input power source to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the power and relay connector after installation.

Figure 2-13 Stripping the Power Connection Wire

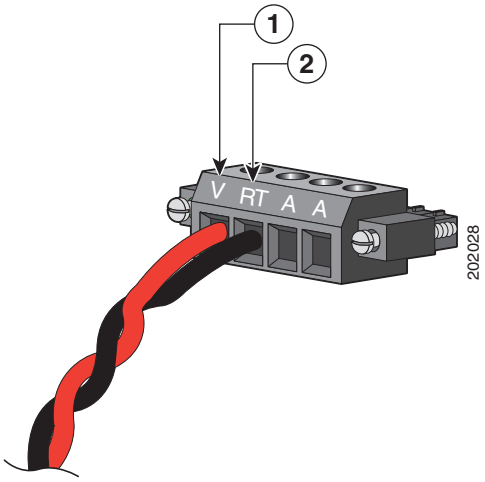


1	0.25 in. (6.3 mm) ± 0.02 in. (0.5 mm)

Step 5 Insert the exposed part of the positive wire into the connection labeled V and the exposed part of the return wire into the connection labeled RT. See Figure 2-14. Make sure that you cannot see any wire lead. Only wire *with insulation* should extend from the connector.

Warning **An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the power and relay connector. Statement 122**

Figure 2-14 Inserting Wires in the Power and Relay Connector

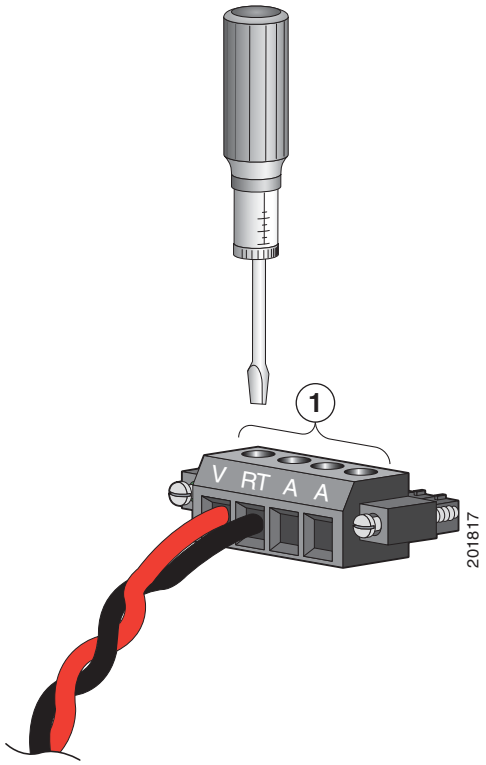


1	Power source positive connection	**2**	Power source return connection

Step 6 Use a ratcheting torque flathead screwdriver to torque the power and relay connector captive screws (above the installed wire leads) to 2.2 in-lb (0.25 Nm). See Figure 2-15.

Caution Do not over-torque the power and relay connector captive screws. The torque should not exceed 2.2 in-lb (0.25 Nm).

Figure 2-15 Torquing the Power and Relay Connector Captive Screws



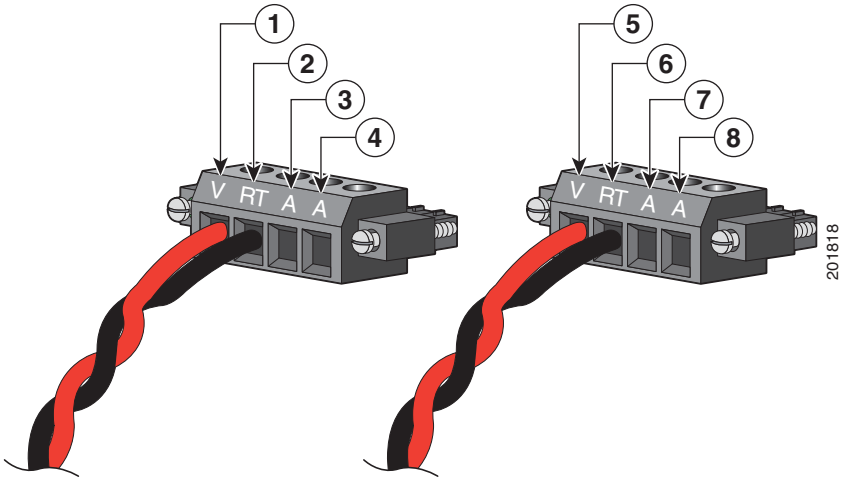
1	Power and relay connector captive screws

Step 7 Connect the other end of the positive wire (the one connected to V) to the positive terminal on the DC power source, and connect the other end of the return wire (the one connected to RT) to the return terminal on the DC power source.

When you are testing the switch, one power connection is sufficient. If you are installing the switch and are using a second power source, repeat Step 4 through Step 7 using a second power and relay connector.

Figure 2-16 shows the completed DC-input wiring on a power and relay connector for a primary power source and an optional secondary power source.

Figure 2-16 Completed DC Power Connections on the Power and Relay Connector



1	Power source A positive connection	**5**	Power source B positive connection
2	Power source A return connection	**6**	Power source B return connection
3	External device 1, relay wire connection	**7**	External device 2, relay wire connection
4	External device 1, relay wire connection	**8**	External device 2, relay wire connection

If your power source is –48 VDC, the following table descibes the your wiring connections for Figure 2-16.

1	Power source A return connection	**5**	Power source B return connection
2	Power source A –48 VDC connection	**6**	Power source B –48 VDC connection
3	External device 1, relay wire connection	**7**	External device 2, relay wire connection
4	External device 1, relay wire connection	**8**	External device 2, relay wire connection

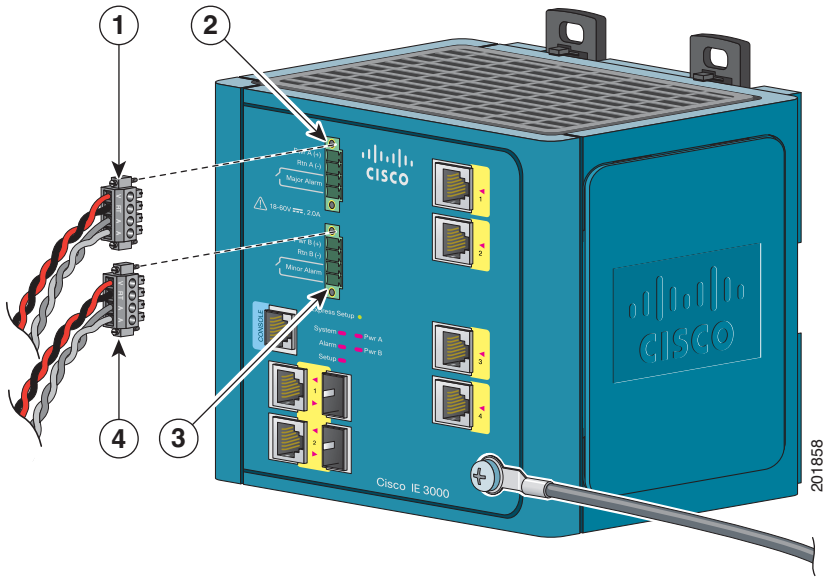
Step 8 (Optional) If you plan to connect external alarm devices to the alarm relays and the switch is already installed, go to the "Wiring the External Alarms" section on page 2-37. Otherwise, go to the "Verifying Switch Operation" section on page 2-13.

Attach the Power and Relay Connector to the Switch

To attach the power and relay connectors to the front panel of the switch, follow these steps:

Step 1 Insert the power and relay connector into the Pwr A receptacle on the switch front panel. See Figure 2-17.

Figure 2-17 Connecting the Power and Relay Connector to the Switch



1	Power source A connector	**3**	Pwr B receptacle
2	Pwr A receptacle	**4**	Power source B connector

Step 2 Use a racheting torque flathead screwdriver to tighten the captive screws on the sides of the power and relay connector.

When you are testing the switch, one power source is sufficient. If you are installing the switch and are using a second power source, repeat this procedure for the second power and relay connector (Pwr B), which installs just below the primary power connector (Pwr A).

When you are installing the switch, secure the wires coming from the power and relay connector so that they cannot be disturbed by casual contact. For example, use tie wraps to secure the wires to the rack.

Attaching DC Power to the PoE Expansion Modules

If your switch configuration includes either the IEM-3000-4PC or the IEM-3000-4PC-4TC PoE expansion modules, you must attach source DC directly to the expansion module's Input DC terminal block. Source DC can come from either the PWR-IE65W-PC-DC, a DC-input power supply, the PWR-IE65W-PC-AC, an AC-input power supply, or from site source DC; however, site source power voltage must be 48–54VDC.

If you are using the above Cisco PoE AC/DC power supplies, you can power up to 4 PoE or 2 PoE+ devices on each expansion module.

To attach site source DC to the expansion module:

Warning **The equipment is to be connected to a UL Listed, limited power source. Statement 170**

Note Warning statement 170 is applicable only to office/computer room environments (IEC 60950).

Step 1 Verify that power is off to the DC circuit you are going to attach to the DC-input power supply. As an added precaution, place the appropriate safety flag and lockout devices at the source power circuit breaker, or place a piece of adhesive tape over the circuit breaker handle to prevent accidental power restoration while you are working on the circuit.

Step 2 Measure a length of twisted-pair copper wire long enough to connect the site source DC to the PoE expansion module's Input DC terminal block.

For DC connections from the site source DC to the PoE expansion module, use 18-AWG (0.75 mm^2) twisted-pair copper wire, such as Belden part number 9344 or the appropriate type, wire size, and color-code for your country.

Step 3 Using a wire-stripping tool, strip both ends of the twisted pair wires to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wires.

Step 4 Attach the twisted-pair wire leads into the site source DC positive (+) and negative (-) connectors. Verify that only insulated wire extends from the connectors.

Step 5 Secure the twisted-pair leads to the source DC connectors.

Step 6 Connect the other end of the twisted-pair wire leads to the Input DC terminal block connectors on the PoE expansion module making sure that only insulated wire extends beyond the terminal block.

Verify that the positive (+) wire goes from the source DC positive (+) connector to the positive (+) connector on the expansion module and that the source DC negative (-) wire goes to the negative (-) connector on the expansion module.

Step 7 Secure the twisted-pair leads to the terminal block connectors using the torque ratchet screwdriver to tighten the expansion module terminal block screws.

Note Do not overtighten the terminal block screws. The torque on the screws should not exceed 2.2 in-lb (0.25 Nm).

Step 8 When you are ready to power up the switch, remove the safety flag and lockout devices from the PoE expansion module DC circuit and turn on the power to power up the module.

Running POST

When the switch powers on, it automatically initiates a POST. The POST runs a series of tests that verify that the switch functions properly and ensures that it is ready to install. To test the switch, follow these steps:

- Applying Power to the Switch, page 2-25
- Verify POST Results, page 2-25
- Disconnect Power, page 2-26

Applying Power to the Switch

To apply power to a switch that is directly connected to a DC power source, locate the circuit breaker on the panel board that services the DC circuit, and switch the circuit breaker to the ON position.

Note For instructions on how to apply power to a switch that is connected to a power converter, see the "Applying Power to the Power Converter" section on page 2-56.

If you have installed a PoE expansion module (either IEM-3000-4PC or IEM-3000-4PC-4TC) to the switch, you must attach DC power directly to the expansion module. DC power can be either from site source DC (verify that source DC power meets the power input requirements of the expansion module) or from a separate DC-power supply (PWR-IE65W-PC-DC or PWR-IE65W-PC-AC). If your switch configuration consists of two PoE expansion modules, you must connect each PoE expansion module to a separate power supply. For instructions on how to connect the DC-input power supply to the PoE expansion module, refer to the Cisco IE 3000 65 W DC-Input Power Supply Installation Note available on cisco.com. For instructions on how to connect the AC-input power supply to the PoE expansion module, refer to the Cisco IE 3000 65 W AC-Input Power Supply Installation Note available on cisco.com.

Verify POST Results

When you power on the switch, it automatically begins POST. All LEDs are off for a few seconds, and then each LED is tested. One at a time, the System, Alarm, Setup, Pwr A, and Pwr B LEDs each briefly turn green, then red, and then go off. The System LED blinks green as the boot loader verifies the basic functionality of the processing and memory hardware. Assuming all tests pass, the System LED continues to blink green as the Cisco IOS software image loads. If the POST fails, the System LED turns red.

Note POST failures are usually fatal. Call Cisco Systems immediately if your switch does not pass POST. See the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section on page viii.

Disconnect Power

After successfully running POST, follow these steps.

Step 1 Turn off power to the switch.

Step 2 Disconnect the cables.

Step 3 Decide where you want to install the switch.

Installing the Switch

This section describes how to install the switch:

- Installing the Switch on a DIN Rail
- Installing the Switch on the Wall
- Installing the Switch in a Rack

Warning **This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.**

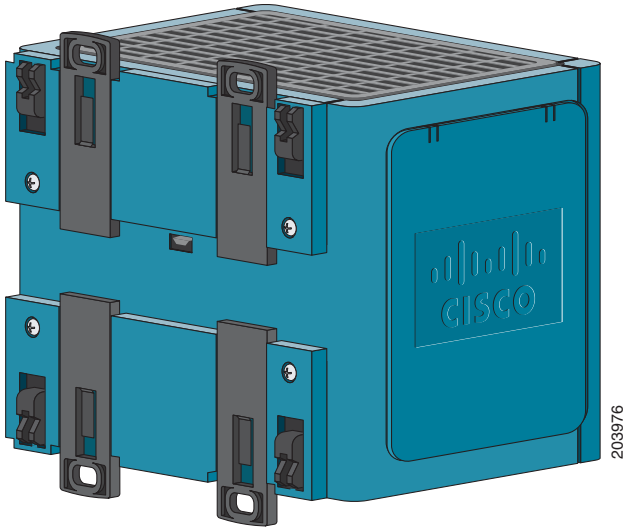
The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Caution To prevent the switch from overheating, ensure these minimum clearances:
– Top and bottom: 4.13 in. (105 mm)
– Exposed side (not connected to the module): 3.54 in. (90 mm)
– Front: 2.56 in. (65 mm)

Installing the Switch on a DIN Rail

The switch ships with latches on the rear panel for a mounting on a DIN rail. See Figure 2-18.

Figure 2-18 Cisco IE 3000 Switch Rear Panel



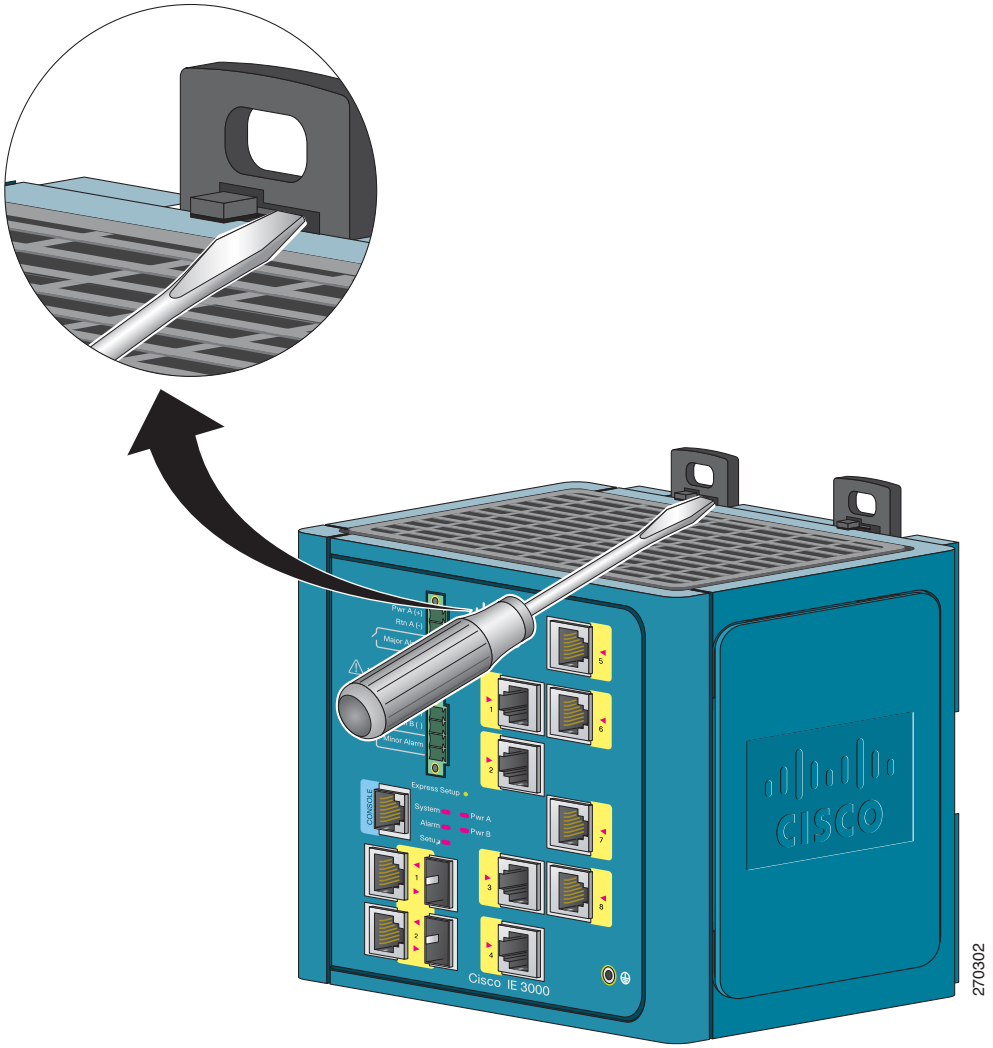
You can install the switch as a standalone device on the DIN rail or with the expansion modules already connected. You must connect expansion modules to the switch before installing the switch on the DIN rail. To connect the modules to the switch, follow the steps described in the "Adding Modules to the Switch" section on page 2-5.

The illustrations in this procedure show how to install the switch as a standalone device. The same steps can be used to install a switch with expansion modules on the DIN rail.

To attach the switch to a DIN rail, follow these steps.

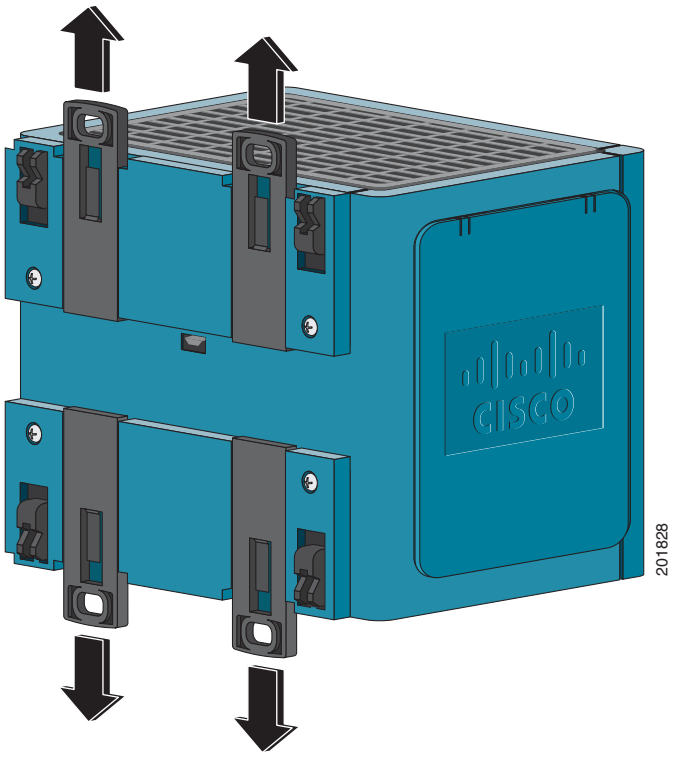
Step 1 Use a flathead screwdriver to press in the space next to the tab on each of the latches and turn the screw driver clockwise. See Figure 2-19.

Figure 2-19 Unlock the Switch Latch



Step 2 Push out on the DIN rail latches. See Figure 2-20.

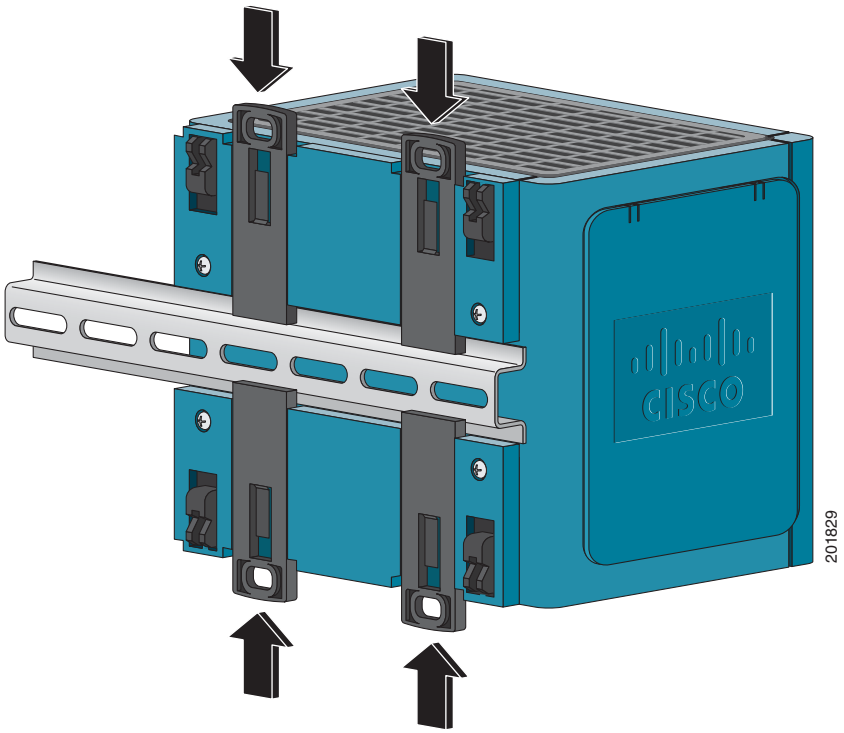
Figure 2-20 Pushing the DIN Rail Latches Out



Step 3 Position the rear panel of the switch directly in front of the DIN rail, making sure that the DIN rail fits in the space between the two latches.

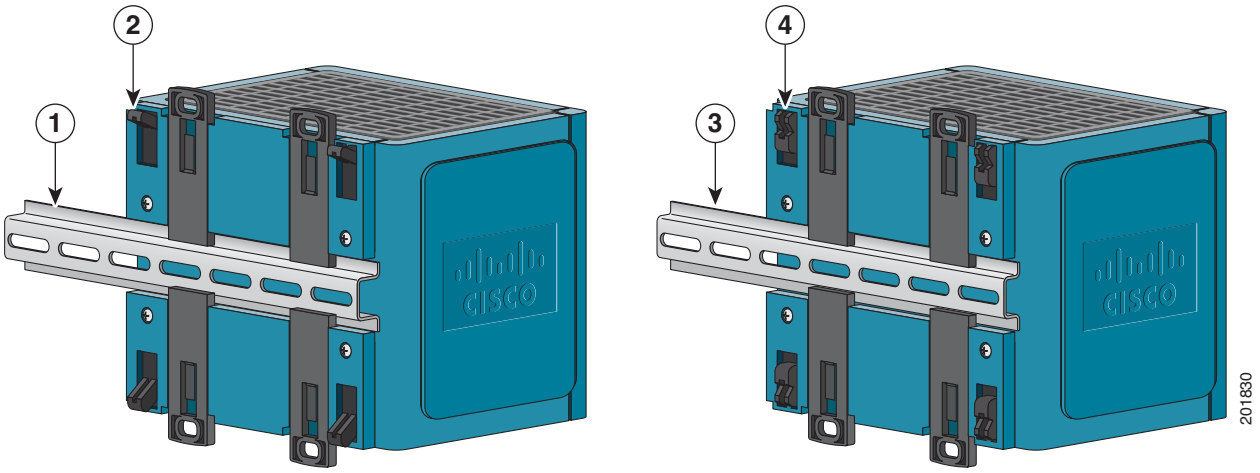
Step 4 Push the DIN rail latches in after the switch is over the DIN rail. See Figure 2-21.

Figure 2-21 Pushing the DIN Rail Latches In



Note If you are using a 15-mm DIN rail, rotate all of the feet (see Figure 2-21) to the extended positions. Otherwise, rotate all of the feet to the recessed positions. Figure 2-22 shows the two DIN rails. You can use either the 7.5-mm or the 15-mm DIN rail.

Figure 2-22 Mounting the Switch on a DIN Rail in a Parallel Position



1	15-mm DIN rail	**3**	7.5-mm DIN rail
2	Foot in extended position	**4**	Foot in recessed position

After the switch is mounted on the DIN rail, connect the power and alarm wires, as described in the "Connecting Power and Alarm Circuits" section on page 2-36.

Note For instructions on how to remove the switch from a DIN rail, see the "Removing the Switch from a DIN Rail or a Rack" section on page 2-35.

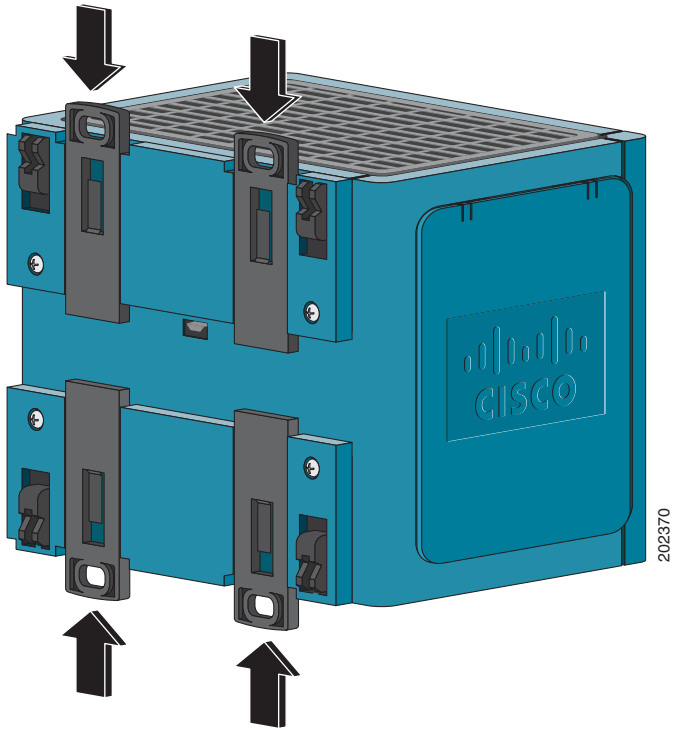
Installing the Switch on the Wall

To attach the switch to a wall or a panel, follow these steps.

Warning **Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system. Statement 378**

Step 1 If the DIN rail latches are pushed out, push in the DIN rail latches. See Figure 2-23.

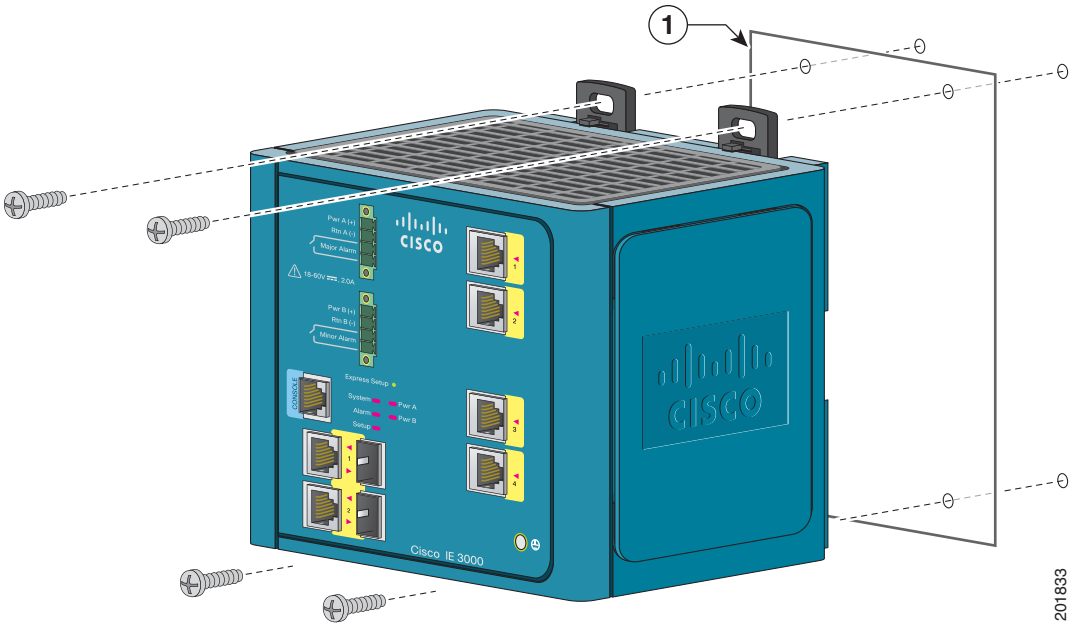
Figure 2-23 Pushing the DIN Rail Latches In



Step 2 Rotate all feet to the recessed positions so that the switch can mount flat on the wall or panel. See Figure 2-22.

Step 3 Position the rear panel of the switch against the wall or a panel in the desired location. See Figure 2-24.

Figure 2-24 Mounting the Switch on the Wall



Step 4 Place a number-10 screw that you provide through each DIN rail latch, and screw them into the wall.

1	Wall

After the switch is mounted on the wall or panel, connect the power and alarm wires, as described in the "Connecting Power and Alarm Circuits" section on page 2-36.

Installing the Switch in a Rack

You can use an optional DIN rail adapter kit (available through Cisco, part number STK-RACKMNT-2955=) to mount the switch in a 19-inch rack. The rack-mounting kit comes with a DIN rail adapter and screws to attach the adapter to the rack. Ask your Cisco representative for details.

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

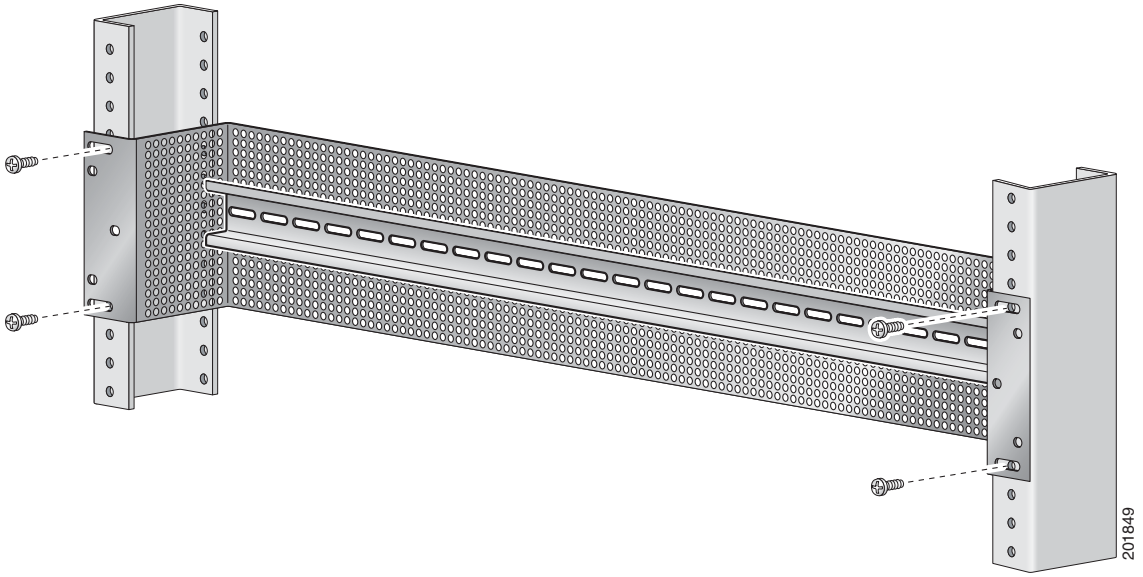
- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006**

Note The 19-inch rack adapter is not intended for application in an industrial environment and therefore it will not meet the environmental performance specifications for the Cisco IE 3000 switch.

To install the switch in a rack, follow these steps:

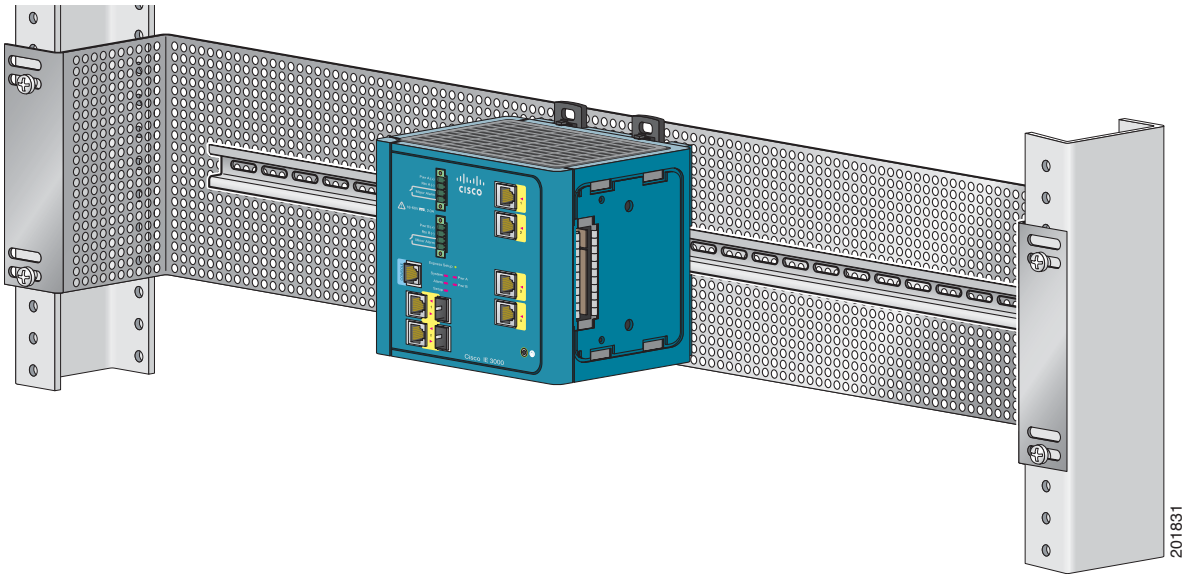
Step 1 Use the four Phillips machine screws to securely attach the brackets to the rack. See Figure 2-25.

Figure 2-25 Installing the DIN Rail on the Rack



Step 2 Follow the steps described in the Installing the Switch on a DIN Rail, page 27.

Figure 2-26 Installing the Switch on a Rack



After the switch is mounted in the rack, connect the power and alarm wires, as described in the "Connecting Power and Alarm Circuits" section on page 2-36.

For instructions on how to remove the switch from a rack, see the "Removing the Switch from a DIN Rail or a Rack" section on page 2-35.

Removing the Switch from a DIN Rail or a Rack

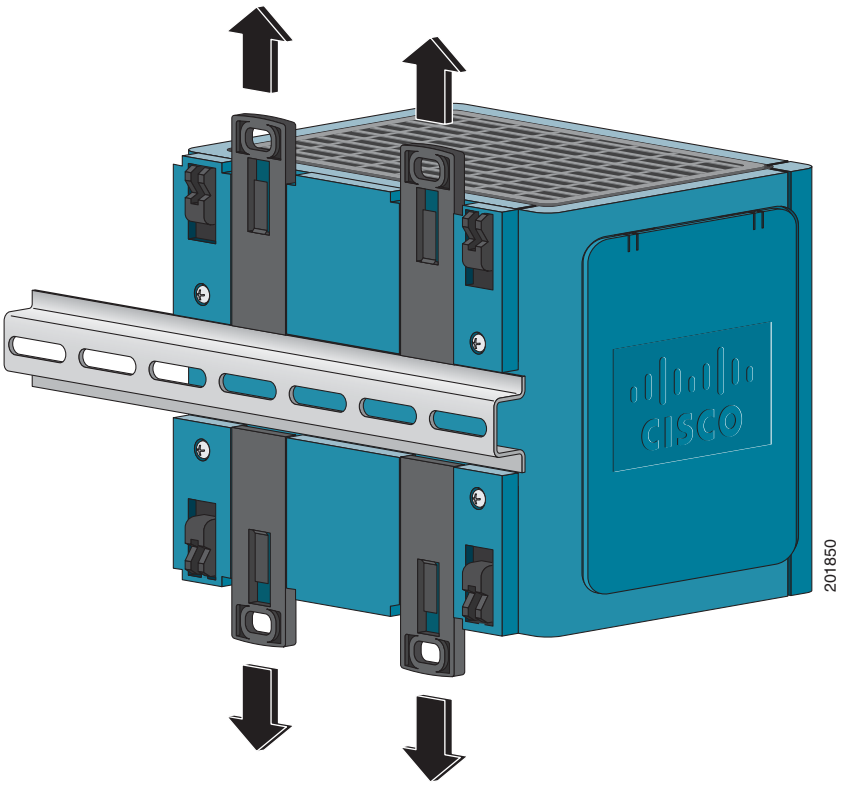
To remove the switch from a DIN rail or a rack, follow these steps:

Step 1 Ensure that power is removed from the switch, and disconnect all cables and connectors from the front panel of the switch.

Step 2 Use a tool such as a flathead screw driver to press in the space next to the tab on each of the latches and turn the screw driver clockwise. See Figure 2-19.

Step 3 Push the DIN rail latches at the top of the switch up, and the latches at the bottom of the switch down. Pull the switch out, and release the switch from the DIN rail. See Figure 2-27.

Figure 2-27 Removing the Switch from the DIN Rail



Step 4 Remove the switch from the DIN rail.

Connecting Power and Alarm Circuits

After the switch is installed, you are ready to connect the DC power and alarm relays.

- Wiring the Protective Ground and DC Power, page 2-36
- Wiring the External Alarms, page 2-37

Wiring the Protective Ground and DC Power

Note The switch can use either a dual or single positive DC input (24V/48V), or a single negative DC input (-24V/-48V). Dual negative DC inputs are not supported.

For instructions on grounding the switch and connecting the DC power, see the "Connecting the Protective Ground and DC Power" section on page 2-15.

For instructions on using a power converter for DC power, see the "Connecting the Switch to the Power Converter" section on page 2-48.

Wiring the External Alarms

The alarm relays on the switch are normally open. To connect an external alarm device to the relays, you must connect two relay contact wires to complete an electrical circuit. Because each external alarm device requires two connections to a relay, the switch supports a maximum of two external alarm devices. This procedure is optional.

Caution The input voltage source of the alarm circuits must be an isolated source and limited to less than or equal to 24 VDC, 1 A.

Note Wire connections to the power and relay connector, must be UL- and CSA-rated, style 1007 or 1569 twisted-pair copper appliance wiring material (AWM) wire (such as Belden part number 9318).

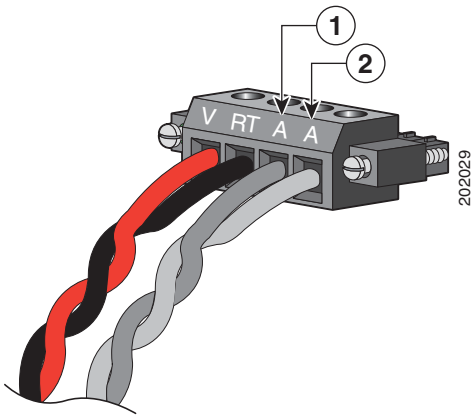
To wire the switch to an external alarm device, follow these steps:

Step 1 Measure two strands of twisted-pair wire (18-to-20 AWG) long enough to connect to the external alarm device.

Step 2 Use a wire stripper to remove the casing from both ends of each wire to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wires. Stripping more than the recommended amount of wire can leave exposed wire from the power and relay connector after installation.

Step 3 Insert the exposed wires for the external alarm device into the two connections labeled A. See Figure 2-28.

Figure 2-28 Inserting Relay Wires into the Power and Relay Connector

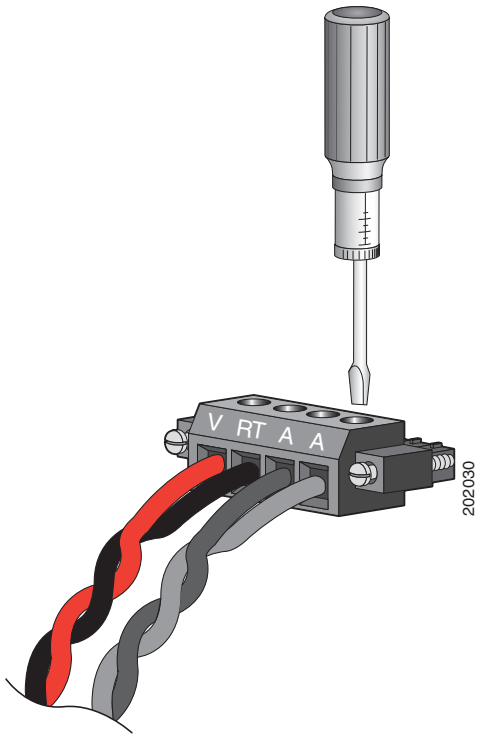


1	External device, relay wire A connection 1	**2**	External device, relay wire A connection 2

Step 4 Use a ratcheting torque flathead screwdriver to torque the power and relay connector captive screw (above the installed wire leads) to 2 in-lb (0.22 Nm). See Figure 2-29 for details.

Caution Do not over-torque the power and relay connector captive screws. The torque should not exceed 2.2 in-lb (0.25 Nm).

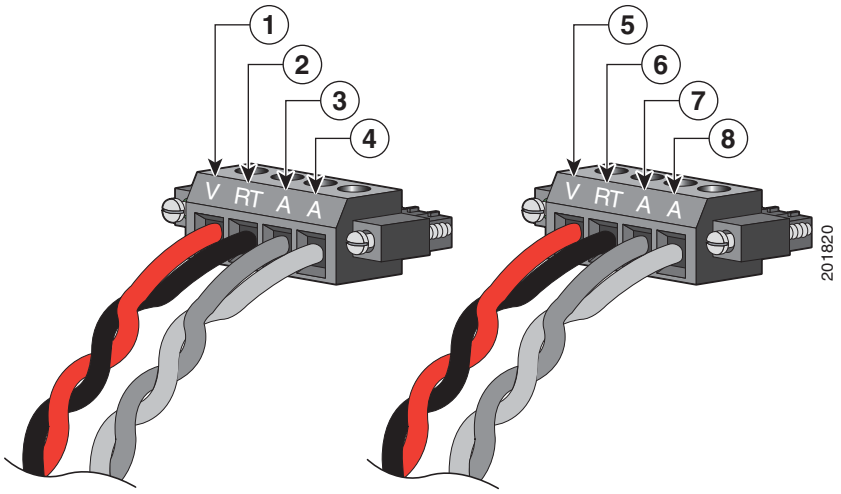
Figure 2-29 Torquing the Power and Relay Connector Captive Screws



Step 5 Repeat Step 1 through Step 4 to insert the input and output wires of an additional external alarm device into the second power and relay connector.

Figure 2-30 shows the completed wiring for two power supplies and two external alarm devices.

Figure 2-30 Completed Connections for Two External Alarm Devices on the Power and Relay Connector



1	Power source A positive connection	**5**	Power source B positive connection
2	Power source A return connection	**6**	Power source B return connection
3	External device 1, relay wire major alarm connection	**7**	External device 2, relay wire minor alarm connection
4	External device 1, relay wire major alarm connection	**8**	External device 2, relay wire minor alarm connection

If your power source is –48 VDC, this table describes the wiring connections for Figure 2-30.

1	Power source A return connection	**5**	Power source B return connection
2	Power source A –48 VDC connection	**6**	Power source B –48 VDC connection
3	External device 1, relay wire major alarm connection	**7**	External device 2, relay wire minor alarm connection
4	External device 1, relay wire major alarm connection	**8**	External device 2, relay wire minor alarm connection

See the "Attach the Power and Relay Connector to the Switch" section on page 2-23 for instructions on how to connect the power and relay connector to the front panel.

Connecting Destination Ports

These section provide more information about connecting to the destination ports:

Connecting to 10/100 and 10/100/1000 Ports

The switch 10/100/1000 ports automatically configure themselves to operate at the speed of attached devices. If the attached ports do not support autonegotiation, you can explicitly set the speed and duplex parameters. Connecting devices that do not autonegotiate or that have their speed and duplex parameters manually set can reduce performance or result in no linkage.

To maximize performance, choose one of these methods for configuring the Ethernet ports:

- Let the ports autonegotiate both speed and duplex.
- Set the port speed and duplex parameters on both ends of the connection.

Caution To prevent electrostatic-discharge (ESD) damage, follow your normal board and component handling procedures.

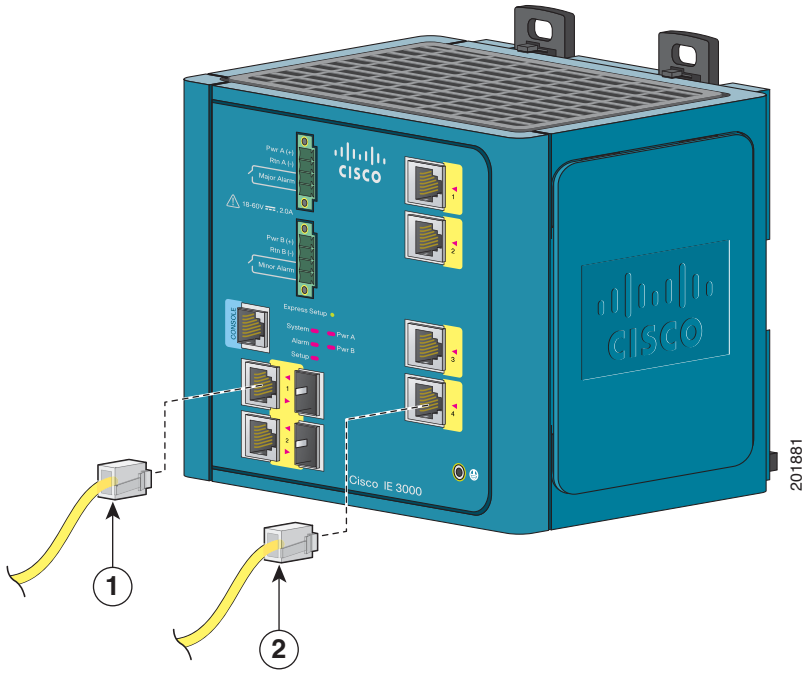
To connect to 10BASE-T, 100BASE-TX or 1000BASE-T devices, follow these steps:

Step 1 When connecting to workstations, servers, routers, and Cisco IP Phones, connect a straight-through cable to an RJ-45 connector on the front panel. See Figure 2-31.

When connecting to 1000BASE-T-compatible devices, to use a twisted four-pair, Category 5 or higher cable.

The auto-MDIX feature is enabled by default. For configuration information for this feature, see the switch software configuration guide or the switch command reference.

Figure 2-31 Connecting to an Ethernet Port



1	10/100/1000 port	**2**	10/100 ports

Step 2 Connect the other end of the cable to an RJ-45 connector on the other device. The port LED turns on when both the switch and the connected device have established link.

The port LED is amber while Spanning Tree Protocol (STP) discovers the topology and searches for loops. This can take up to 30 seconds, and then the port LED turns green. If the port LED does not turn on:

- The device at the other end might not be turned on.
- There might be a cable problem or a problem with the adapter installed in the attached device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 3 Reconfigure and reboot the connected device if necessary.

Step 4 Repeat Steps 1 through 3 to connect each device.

Installing and Removing SFP Transceivers

These sections describe how to install and remove SFP transceivers. SFP transceivers are inserted into SFP transceiver ports on the front of the switch or the Cisco IEM-3000-4SM or Cisco IEM-3000-8SM expansion modules. These field-replaceable transceivers provide the optical interfaces, send (TX) and receive (RX).

You can use any combination of rugged SFP transceiver. See the Cisco IE 3000 release notes for the list of supported SFP transceivers. SFP transceiver types must match on both ends of the network cable and the length of the network cable must not exceed the stipulated cable length for reliable communications. Supported cable lengths for the SFP transceivers are listed in Table C-1 on page C-6.

Caution When you use commercial SFP transceiver types such as CWDM and 1000BX-U/D in the IE-3000-4TC or IE-3000-8TC S switch SFP ports, reduce the maximum operating temperature by 59°F (15°C). The minimum operating temperature is 32°F (0°C). The IEM-3000-4SM or the IEM-3000-8SM expansion module SFP ports do not operate at 1Gbps.

For detailed instructions on installing, removing, and cabling the SFP transceivers, see the SFP module documentation.

Installing SFP Transceivers into Module Ports

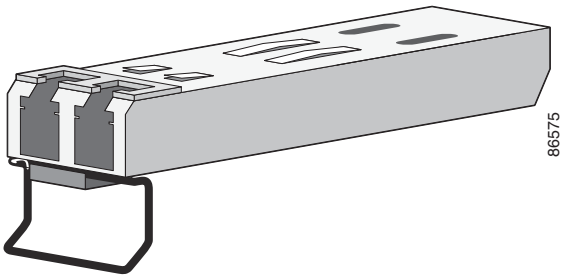
Note This procedure is applicable to SFP ports on either the switches or on the expansion modules.

Figure 2-32 shows an SFP transceiver that has a bale-clasp latch.

Caution We strongly recommend that you do not install or remove the SFP transceiver with fiber-optic cables attached to it because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP transceiver.

Removing and installing an SFP transceiver can shorten its useful life. Do not remove and insert SFP transceiver more often than is absolutely necessary.

Figure 2-32 SFP Transceiver with a Bale-Clasp Latch



To insert an SFP transceiver into the module port, follow these steps:

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a grounded bare metal surface.

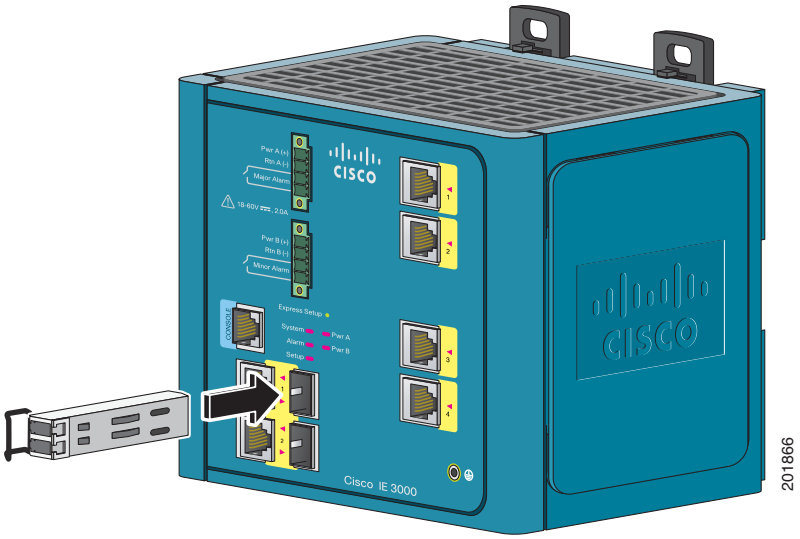
Step 2 Find the send (TX) and receive (RX) markings that identify the correct side of the SFP transceiver.

Note On some SFP transceivers, the send and receive (TX and RX) markings might be replaced by arrows that show the direction of the connection, either send or receive (TX or RX).

Step 3 Position the SFP transceiver in front of the port opening.

Step 4 Slide the SFP transceiver into the port until you feel the transceiver connector latch into place. See Figure 2-33.

Figure 2-33 Installing an SFP Transceiver into an Module Port



Caution Do not remove the dust plugs from the SFP transceiver port or from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP transceiver optical connector and cables from contamination.

Step 5 Using your thumb, press firmly on the SFP transceiver to ensure that the SFP is properly latched in the port.

Step 6 When you are ready to install the network cable, remove the dust plugs from both the cable and the SFP transceiver and store them away for future use. Insert the LC network cable connector into the SFP transceiver.

Removing SFP Transceivers from Module Ports

To remove an SFP transceiver from a module port, follow these steps:

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a grounded bare metal surface.

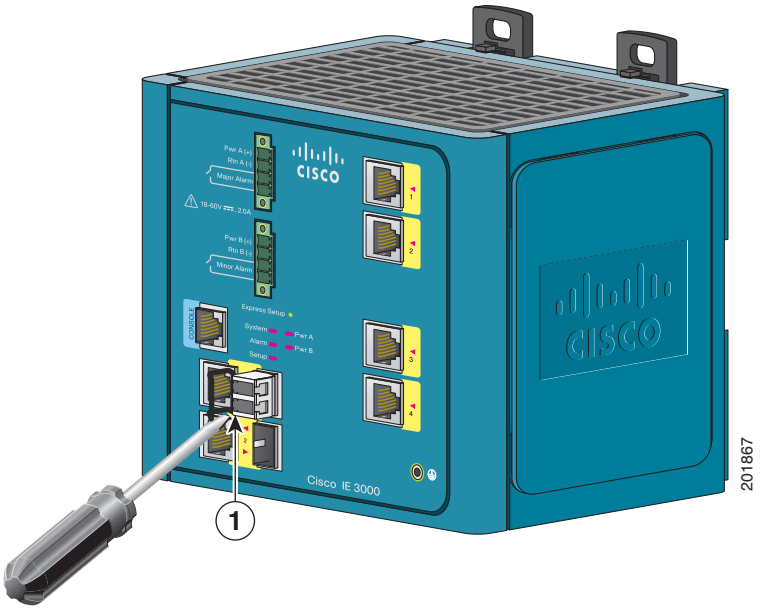
Step 2 Disconnect the network cable LC connector from the SFP transceiver.

Step 3 Immediately insert a dust plug into the optical ports of the SFP transceiver and the network cable LC connector to keep the optical interfaces clean.

Step 4 Rotate the bale-clasp downand remove the SFP transceiver. See Figure 2-34.

If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.

Figure 2-34 Removing a Bale-Clasp Latch SFP Transceiver Using a Flat-Blade Screwdriver



1	Bale clasp

Step 5 Grasp the SFP transceiver between your thumb and index finger, and carefully remove it from the module port.

Step 6 Place the removed SFP transceiver in an antistatic bag or other protective environment.

Connecting to SFP Transceivers

This section describes how to connect to a fiber-optic SFP port. To connect to an RJ-45 Gigabit Ethernet port instead of a fiber-optic port, see the "Connecting to a Dual-Purpose Port" section on page 2-45.

For instructions on how to install or remove an SFP transceiver, see the "Installing and Removing SFP Transceivers" section on page 2-41.

Follow these steps to connect a fiber-optic cable to an SFP transceiver:

Warning **Class 1 laser product. Statement 1008**

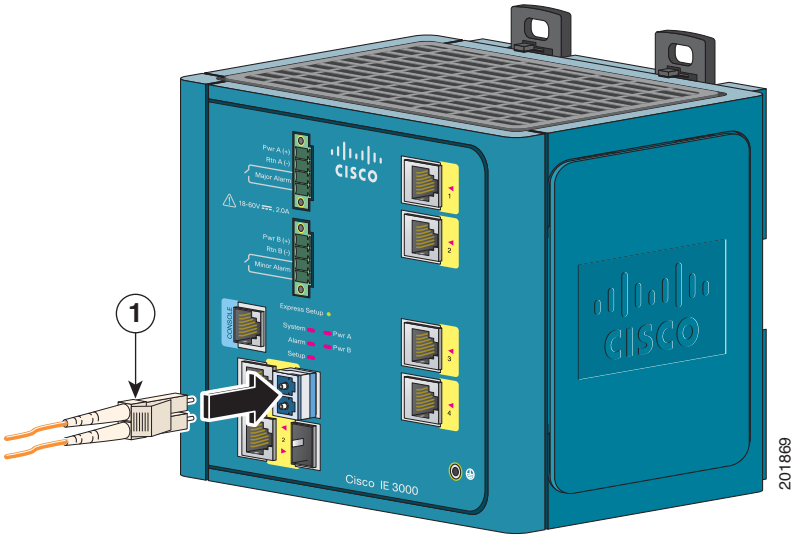
Caution Do not remove the rubber plugs from the SFP transceiver port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP transceiver optical bores and cables from contamination.

Before connecting to the SFP module, be sure that you understand the port and cabling stipulations in the "Preparing for Installation" section on page 2-1. See Appendix C, "Cable and Connectors," for information about the LC on the SFP transceiver.

Step 1 Remove the rubber plugs from the transceiver and fiber-optic cable, and store them for future use.

Step 2 Insert the fiber-optic cable LC connector into the SFP transceiver. See Figure 2-35.

Figure 2-35 Connecting a Fiber-Optic LC Connector into an SFP Transceiver



1	LC connector

Step 3 Insert the other cable end into a fiber-optic receptacle on a target device.

Step 4 Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 5 If necessary, reconfigure and restart the switch or the target device.

Connecting to a Dual-Purpose Port

The dual-purpose port is a single port with two interfaces, one for an RJ-45 cable and another for an SFP module. Only one interface can be active at a time. If both interfaces are connected, the SFP module has priority. For more information about dual-purpose ports, see the "Dual-Purpose Ports" section on page 1-8.

Warning **Class 1 laser product. Statement 1008**

Caution Do not remove the rubber plugs from the SFP transceiver port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP transceiver optical bores and cables from contamination.

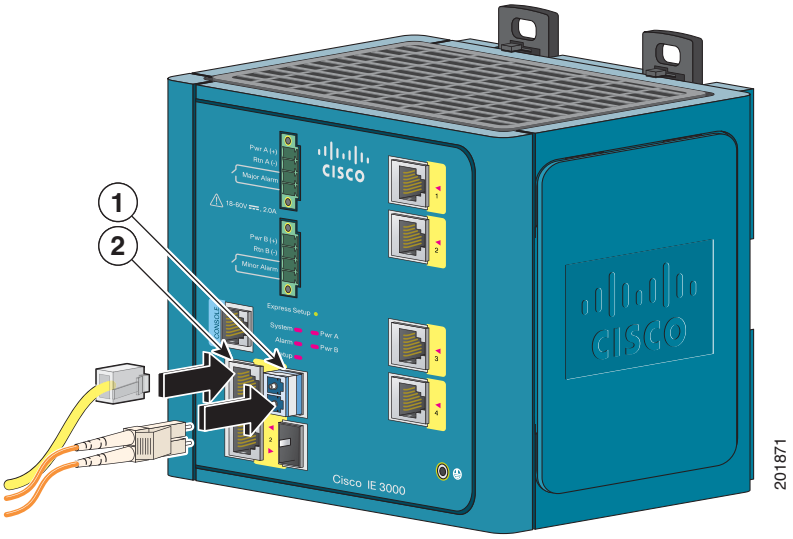
Before connecting to the SFP module, be sure that you understand the port and cabling stipulations in the "Preparing for Installation" section on page 2-1. See Appendix C, "Cable and Connectors," for information about the LC on the SFP module.

To connect to a dual-purpose port, follow these steps:

Step 1 Connect an RJ-45 connector to the 10/100/1000 port, or install an SFP transceiver into the module port, and connect a cable to the SFP transceiver. See Figure 2-36.

For more information about RJ-45 connections, SFP transceivers, and optical connections, see the "Connecting to 10/100 and 10/100/1000 Ports" section on page 2-40, the "Installing and Removing SFP Transceivers" section on page 2-41, and the "Connecting to SFP Transceivers" section on page 2-44.

Figure 2-36 Connecting to a Dual-Purpose Port



1	LC connector	**2**	RJ-45 connector

Step 2 Connect the other end of the cable to the other device.

By default, the switch detects whether an RJ-45 connector or SFP transceiver is connected to a dual-purpose port and configures the port accordingly. You can change this setting and configure the port to recognize only an RJ-45 connector or only an SFP module by using the **media type** interface configuration command. For more information, see the switch command reference.

Connecting to 100BASE-FX Ports

Follow these steps to connect a fiber-optic cable to an Cisco IEM-3000-8FM expansion module:

Warning **Class 1 laser product. Statement 1008**

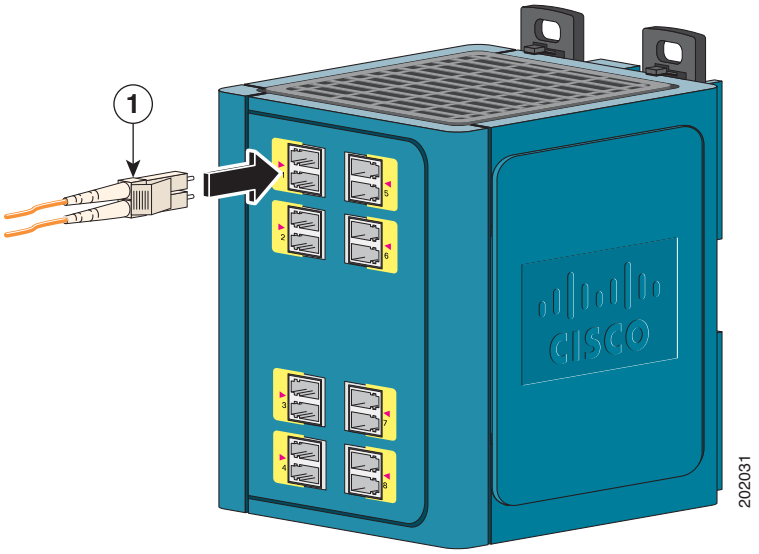
Caution Do not remove the rubber plugs from the SFF module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFF module ports and cables from contamination.

Before connecting to the SFF module port, be sure that you understand the port and cabling stipulations in the "Preparing for Installation" section on page 2-1. See the "Cable and Adapter Specifications" section on page C-5 for information about the LC connector on the SFF module.

Step 1 Remove the rubber plugs from the module port and fiber-optic cable, and store them for future use.

Step 2 Insert one end of the fiber-optic cable into the SFP module port. See Figure 2-37.

Figure 2-37 Connecting to a Fiber-Optic SFP Module Port



1	LC connector

Step 3 Insert the other cable end into a fiber-optic receptacle on a target device.

Step 4 Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If an LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 5 If necessary, reconfigure and restart the switch or target device.

Connecting to a PoE Port

The expansion module PoE ports support either the IEEE 802.3af standard (PoE), which provides up to 15.4 W of power per port (4 ports total), or the IEEE 802.3at standard (PoE+), which provides up to 30 W of power per port. To allow 4 PoE+ ports, the following command line is required when using over 65 W power input to the expansion module:

```
[power inline wattage <mod> max <4-130> watts]
```

Connecting the Switch to the Power Converter

The Cisco IE 3000 switch can be used with an optional AC/DC power converter (PWR-IE3000-AC).

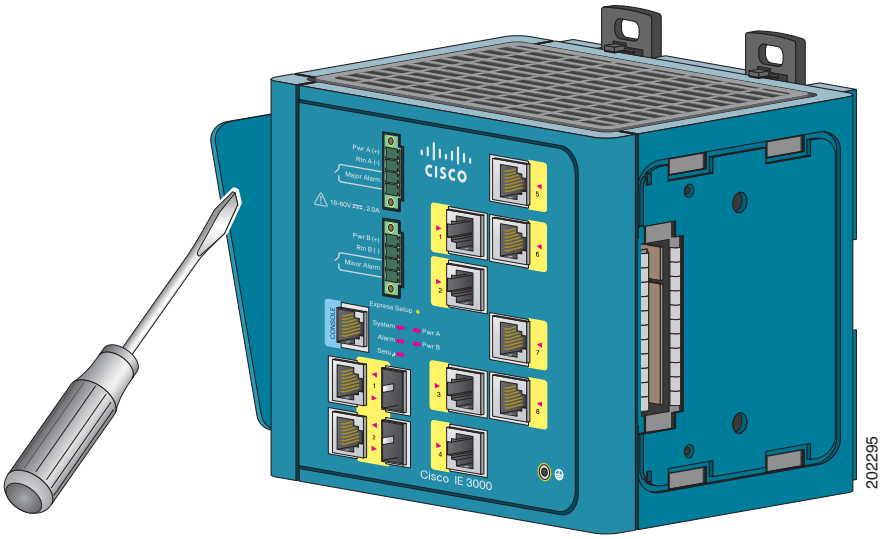
These sections describe the steps required to connect the switch to a power converter:

Attaching the Power Converter to the Switch

To connect the power converter to the switch, follow these steps:

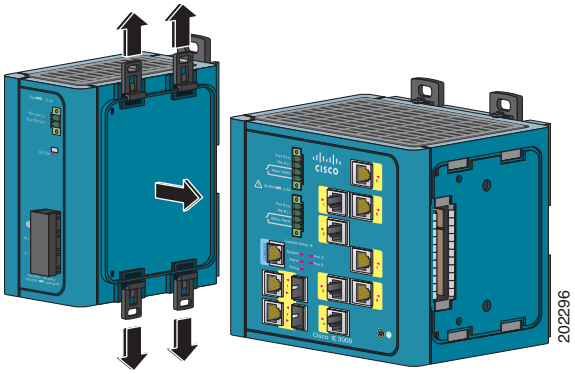
Step 1 Remove the left side panel of the switch by firmly grasping both sides of it in the middle and pulling it outward. If necessary, use a screwdriver to open the side panel. See Figure 2-38.

Figure 2-38 Opening the Left Side Panel of the Switch



Step 2 Push the upper modules latches (at the top of the switch and the power converter) up and the lower module latches (at the bottom of the switch and the power converter) down. See Figure 2-39.

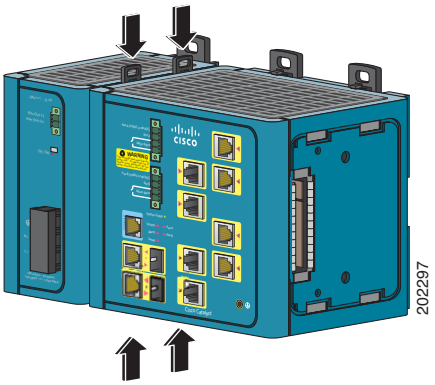
Figure 2-39 Pushing the Module Latches Up and Positioning the Hardware



Step 3 Put the two modules together so that the power module fits in the switch recess.

Step 4 Push the upper module latches down and the lower module latches up to secure the power converter to the switch. See Figure 2-40.

Figure 2-40 Pushing the Latches In



Installing the Power Converter on a DIN Rail, Wall, or Rack Adapter

You install the power converter on a DIN rail, wall, or rack as you would a switch module. You should first attach the power converter to the switch and then install the entire switch assembly on the DIN rail, wall, or rack adapter. For more information, see the "Attaching the Power Converter to the Switch" section on page 2-49, the "Installing the Switch on a DIN Rail" section on page 2-27, the "Installing the Switch on the Wall" section on page 2-31, or the "Installing the Switch in a Rack" section on page 2-33.

Warning **This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.**

The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Caution To prevent the switch assemble from overheating, there must be a minimum of 3 inches (76.19 mm) between any other device and the top, bottom, or sides of the switch assembly.

Connecting the DC Power Clip

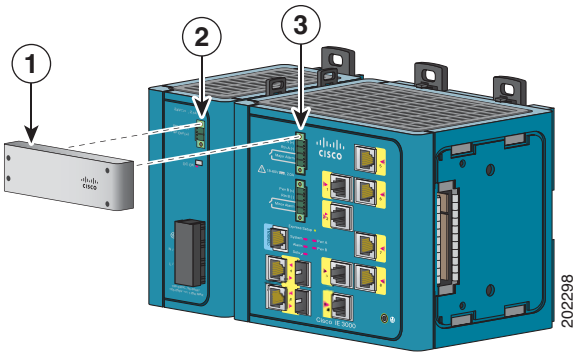
The DC power clip is a prewired cable that connects DC power from the power converter to the switch module. Because the power clip uses the Pwr A connector, you cannot use the alarm connections on that connector.

Follow these steps to connect DC power from the power converter to the switch module.

Step 1 Locate the DC power clip in the power converter accessory kit.

Step 2 Position the power clip so that the two-pin connector is over the power converter and the four-pin connector is over the switch Pwr A connector, and then slide the power clip into these two connectors. See Figure 2-41.

Figure 2-41 Connecting Wires to the Power Converter DC Output Terminal Block



1	DC power clip	**3**	Four-pin connector on the switch
2	Two-pin connector on the power convertor		

Step 3 Use a ratcheting torque flathead screwdriver to tighten the captive screw to 2.2 in-lb (0.25 Nm).

Caution Do not over-torque the power and relay connector captive screws. The torque should not exceed 2.2 in-lb (0.25 Nm).

Connecting the Power Converter to an AC Power Source

These sections describe the steps required to connect the power converter to an AC power source:

- Preparing the AC Power Cord, page 2-51
- Connecting the AC Power Cord to the Power Converter, page 2-52

Preparing the AC Power Cord

To connect the power converter to an AC power source, you need an AC power cord. Power cord connector types and standards vary by country. Power-cord wiring color codes also vary by country. You must to have a qualified electrician select, prepare, and install the appropriate power cord to the power supply.

Note Use copper conductors only, rated at a minimum temperature of 167°F (75°C).

Connecting the AC Power Cord to the Power Converter

The following instructions are provided for a qualified electrician to attach the AC power cord to the power supply.

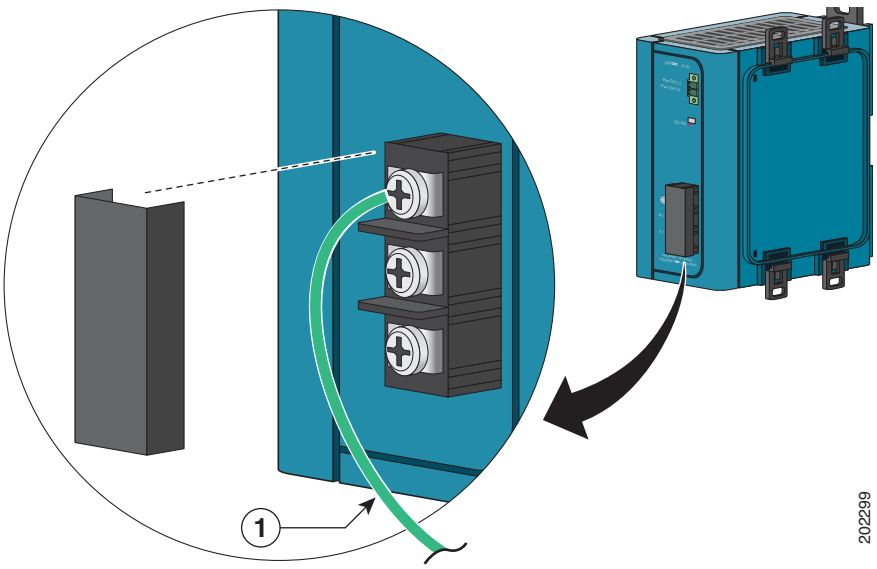
Caution AC power sources must be dedicated AC branch circuits. Each branch circuit must be protected by a dedicated two-pole circuit breaker.

Caution Do not insert the power cord into the AC outlet until the process of wiring the line, neutral, and ground connections has been completed.

To connect the AC power cord to the power converter, follow these steps:

Step 1 Remove the plastic cover from the input power terminals and set it aside. See Figure 2-42.

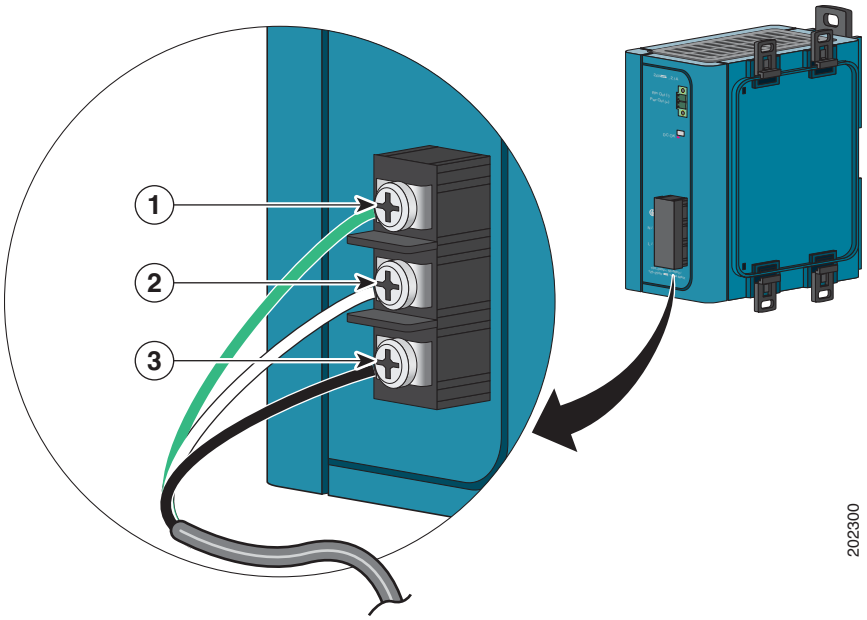
Figure 2-42 AC/DC Power Input Terminal Block



1	Ground wire

Step 2 Insert the exposed ground wire lead into the power converter ground wire connection. Ensure that only wire *with insulation* extends from the connector. See Figure 2-43.

Figure 2-43 Connecting AC Power to the Power Converter



1	Ground	**3**	AC line
2	AC neutral		

Step 3 Tighten the ground wire terminal block screw.

Note The torque should not exceed 2.2 in-lb (0.25 Nm).

Step 4 Insert the line and neutral wire leads into the terminal block line and neutral connections. See Figure 2-43. Make sure that you cannot see any wire lead. Ensure that only wire *with insulation* extends from the connectors.

Step 5 Tighten the line and neutral terminal block screws.

Note The torque should not exceed 2.2 in-lb (0.25 Nm).

Step 6 Replace the plastic cover over the terminal block.

Step 7 Connect the other end of the AC power cord to the AC outlet.

Connecting the Power Converter to a DC Power Source

You can also connect the power converter to a DC power source. The power converter adapts the power source voltage to the 24 VDC that the switch requires.

Follow these steps to connect the power converter to a DC power source.

Note Use copper conductors only, rated at a minimum temperature of 167°F (75°C).

Step 1 Measure a single length of stranded copper wire long enough to connect the power converter to the earth ground. The wire color might differ depending on the country that you are using it in.

For connections from the power converter to earth ground, use shielded 18-AWG stranded copper wire, such as Belden part number 9912 or the equivalent.

Step 2 Measure a length of twisted-pair copper wire long enough to connect the power converter to the DC power source.

For DC connections from the power converter to the DC source, use 18-AWG twisted-pair copper wire, such as Belden part number 9344 or the equivalent.

Step 3 Using a 18-gauge wire-stripping tool, strip the ground wire and both ends of the twisted pair wires to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wires. Stripping more than the recommended amount of wire can leave exposed wire from the power and relay connector after installation. See Figure 2-9.

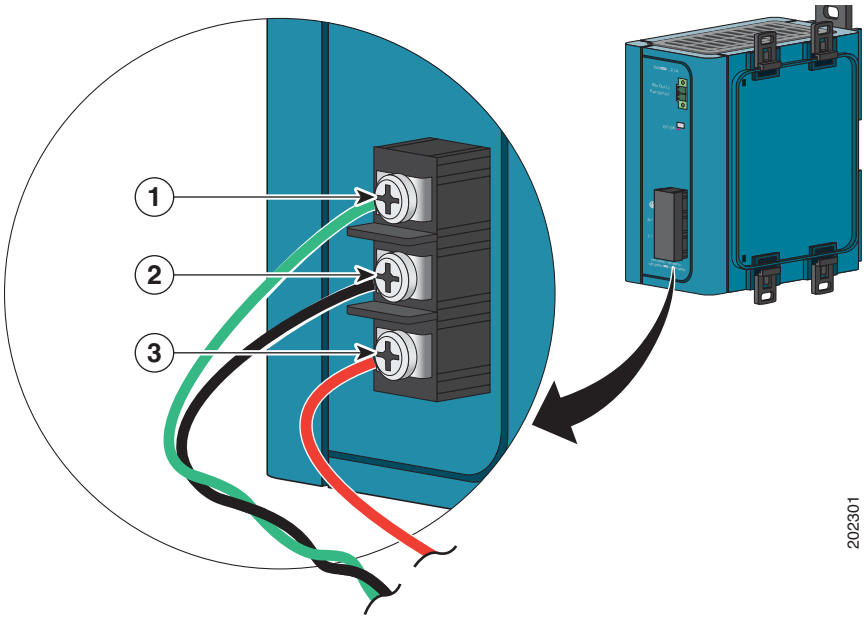
Step 4 Connect one end of the stranded copper wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded bare rack.

Step 5 Insert the other end of the exposed ground wire lead into the earth-ground wire connection on the power converter terminal block. Only wire *with insulation* should extend from the connection. See Figure 2-44.

Step 6 Tighten the earth-ground wire connection terminal block screw.

Note The torque should not exceed 2.2 in-lb (0.25 Nm).

Figure 2-44 AC/DC Power Input Terminal Block Wire Connections to a DC Source



1	Earth ground wire connection	**3**	Positive DC connection
2	Return wire connection (to DC return)		

Warning **An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the power and relay connector. Statement 122**

Step 7 Insert the twisted-pair wire leads into the terminal block line and neutral connections. Insert the wire (labeled number 1 in Figure 2-44) lead into the neutral wire connection and the wire (labeled number 2 in Figure 2-44) lead into the line wire connection. Ensure that only wire *with insulation* extends from the connectors. See Figure 2-44.

Step 8 Tighten the line and neutral terminal block screws.

Note The torque should not exceed 10 in-lb.

Step 9 Connect the red wire to the positive pole of the DC power source, and connect the black wire to the return pole. Ensure that each pole has a current-limiting-type fuse rated to at least 600 VAC/DC (such as the KLKD Midget fuse).

Applying Power to the Power Converter

Move the circuit breaker for the AC outlet or the DC control circuit to the *on* position.

The LED on the power converter front panel is green when the unit is operating normally. The LED is off when the unit is not powered or is not operating normally. After the power is connected, the switch automatically begins the power-on self- test (POST), a series of tests that verifies that the switch functions properly. For instructions on how to interpret POST results, see the "Verify POST Results" section on page 2-25.

Connecting the Switch to the AC-Input Power Supply

The Cisco IE 3000 switch can be used with an optional AC-input power supply (PWR-IE50W-AC or PWR-IE50W-AC-IEC).

These sections describe the steps required to connect the switch to the AC-input power supply:

Attaching the Power Supply to the Switch

Follow these steps to connect the AC-input power supply to the switch:

Step 1 Remove the left side panel of the switch by firmly grasping both sides of it in the middle and pulling it outward. If necessary, use a screwdriver to open the side panel. See Figure 2-38 for a illustration of how to remove the switch side panel.

Step 2 Push the upper modules latches (at the top of the switch and the AC-input power supply) up and the lower module latches (at the bottom of the switch and the AC-input power supply) down. See Figure 2-39 for an illustration showing the latches operation.

Step 3 Put the two modules together so that the AC-input power supply fits in the switch recess.

Step 4 Push the upper module latches down and the lower module latches up to secure the AC-input power supply to the switch.

Installing the AC-input Power Supply on a DIN Rail, Wall, or Rack Adapter

You install the AC-input power supply on a DIN rail, wall, or rack as you would a switch module. You should first attach the AC-input power supply to the switch and then install the entire switch assembly on the DIN rail, wall, or rack adapter. For more information, see the "Attaching the Power Supply to the Switch" section on page 2-56, the "Installing the Switch on a DIN Rail" section on page 2-27, the "Installing the Switch on the Wall" section on page 2-31, or the "Installing the Switch in a Rack" section on page 2-33.

Warning **This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.**

The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Caution To prevent the switch assemble from overheating, there must be a minimum of 3 inches (76.19 mm) between any other device and the top, bottom, or sides of the switch assembly.

Connecting the DC Power Clip

The DC power clip (PWR-IE3000-CLP=) is a prewired cable that connects DC power from the power converter to the switch module. Because the power clip uses the Pwr A connector, you cannot use the alarm connections on that connector.

Follow these steps to connect DC power from the AC-input power supply to the switch module.

Step 1 Locate the DC power clip in the AC-input power supply accessory kit.

Step 2 Position the power clip so that the two-pin connector is over the power converter and the four-pin connector is over the switch Pwr A connector, and then slide the power clip into these two connectors.

Step 3 Use a ratcheting torque flathead screwdriver to tighten the captive screw to 2.2 in-lb (0.25 Nm).

Caution Do not over-torque the power and relay connector captive screws. The torque should not exceed 2.2 in-lb (0.25 Nm).

Connecting the AC-Input Power Supply to an AC Power Source

The following sections provide the steps required to connect the AC-input power supply to source AC. For the AC-input power supply equipped with a source AC terminal block (PWR-50W-AC), you need to have a qualified electrician select, prepare, and install a suitable AC power cord to the AC-input power supply.

For the AC-input power supply equipped with an IEC C14 appliance connector (PWR-50W-AC-IEC), you need to obtain an AC power cord with a suitable AC plug for the locality on one end and a C13 appliance connector on the other end. To connect source AC to the power supply, plug the AC power cord appliance connector into the power supply AC in connector. Plug the other end of the AC power cord into a dedicated source AC outlet.

Connecting the AC Power Cord to the Power Supply

This procedure is provided for a qualified electrician to follow when installing an AC power cord to the AC in terminal block on the AC-input power supply. To connect the AC power cord wires to the power supply terminal block, follow these steps:

Caution AC power sources must be on dedicated AC branch circuits. Each branch circuit must be protected by a dedicated two-pole circuit breaker.

Caution Do not insert the power cord plug into the AC outlet until you have completed wiring the line, neutral, and ground connections.

Step 1 Remove the plastic cover from the input power terminals and set it aside.

Step 2 Loosen the three Phillips-head terminal screws on the terminal block.

Step 3 Insert the exposed ground wire lead into the power supply ground wire connection on the terminal block. Ensure that only wire *with insulation* extends from the connector. Connecting AC Power to the Power Converter

Step 4 Tighten the ground wire terminal block screw.

Note The torque should not exceed 2.2 in-lb (0.25 Nm).

Step 5 Insert the line and neutral wire leads into the terminal block line and neutral connections. Make sure that you cannot see any wire lead. Ensure that only wire *with insulation* extends from the connectors.

Step 6 Tighten the line and neutral terminal block screws.

Note The torque should not exceed 2.2 in-lb (0.25 Nm).

Step 7 Replace the plastic cover over the terminal block.

Step 8 Connect the plug end of the AC power cord into the source AC outlet.

Where to Go Next

If the default configuration is satisfactory, the switch does not need further configuration. You can use any of these management options to change the default configuration:

- Start the device manager, which is in the switch memory, to manage individual and standalone switches. This is an easy-to-use web interface that offers quick configuration and monitoring. You can access the device manager from anywhere in your network through a web browser. For more information, see the switch getting started guide and the device manager online help.
- Start the Cisco Network Assistant application, which is described in the *Getting Started with Cisco Network Assistant* guide. Through this GUI, you can configure and monitor a switch cluster or an individual switch.

- Use the CLI to configure the switch as an individual switch from the console. See the switch command reference on Cisco.com for information about using the CLI.
- Start an SNMP application such as the CiscoView application.

Start the Common Industrial Protocol (CIP) management tool. You can manage an entire industrial automation system with the CIP-based tools.